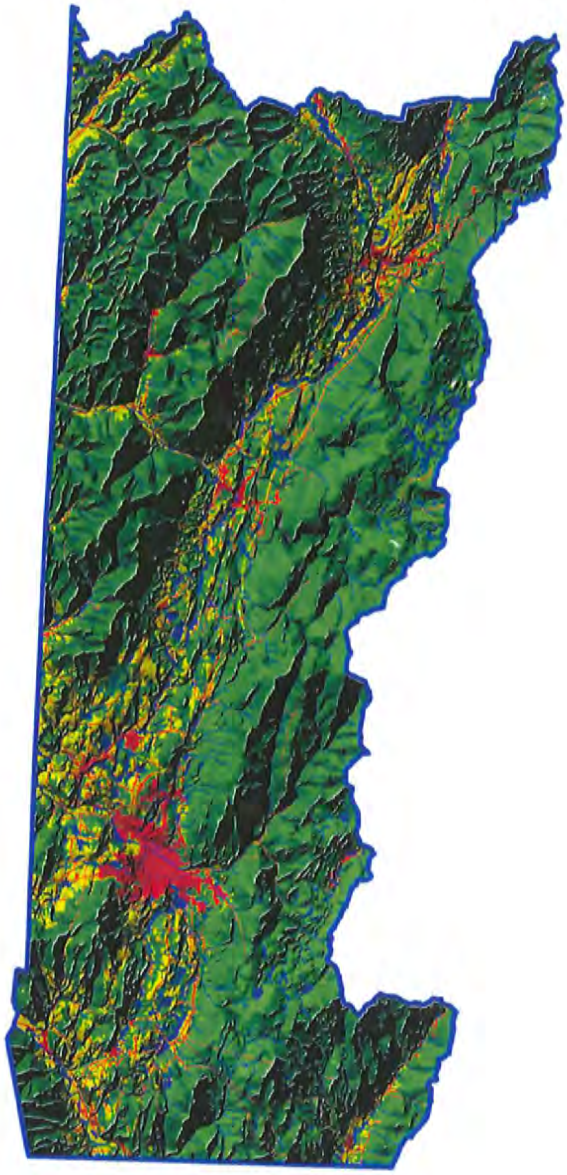
Basin 1

Battenkill , Hoosic, & Walloomsac Rivers Assessment Report



Agency of Natural Resources
Department of Environmental Conservation
Water Quality Division

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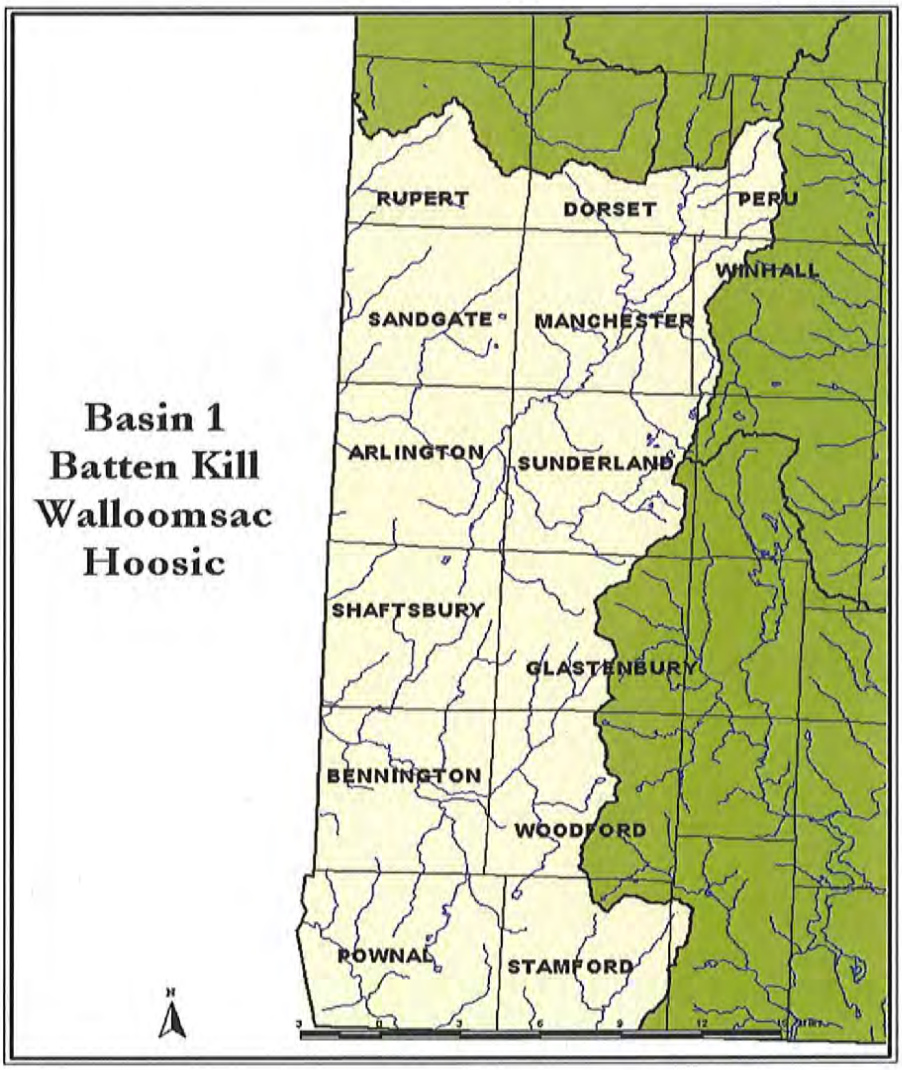
Contents

The Watersheds of Basin 1

Basin 1 includes the Batten Kill, Walloomsac River and Hoosic River watersheds, which are located in the southwestern corner of Vermont. The relatively small basin includes land in three of the biophysical regions of the state: the Taconic Mountains, the Vermont Valley and the Southern Green Mountains. Each of these three main rivers in the basin flow into New York state as part of the larger Hudson River drainage and so the information following is limited to the Vermont portion of the watershed unless otherwise specified. The figure below shows the location of the Basin 1 watersheds and the Vermont towns in these watersheds.



The Batten Kill Watershed

The Vermont portion of the Batten Kill watershed drains much of the northern portion of Bennington County and includes an area of approximately 200 square miles. The Batten Kill rises in East Dorset and flows south with Mad Tom Brook soon joining it from the southern slope of Mount Tabor. It flows in a southwesterly direction to Arlington and then in a westerly direction to the Hudson River in New York, which it enters at a point one mile north of Schuylerville, New York. Two hundred and seven square miles of the drainage area of the basin are located in the New York portion of the watershed. From source to mouth following the major windings, it measures approximately 55 miles. The length of the river in Vermont is approximately 24 miles.

The Vermont portion of the Batten Kill watershed is mountainous, steep and heavily forested. The tributaries are, for the most part, wooded, steep and narrow. National Forest Service land in this watershed is almost 44,000 acres. The average yearly rainfall over the entire basin area is 42.9 inches. The following river and tributary descriptions for the Vermont portion of the basin were taken in part from the United States Geological Survey, Department of the Interior Publication *Surface Waters of Vermont.*

Mad Tom Brook rises on the southern slope of Mount Tabor in the northwestern part of the town of Peru at an altitude of 2,900 feet above sea level. It flows southward and south-westward to East Dorset where it joins the beginning of the Batten Kill from the north. Its length is about 5 ½ miles and its fall is about 2,100 feet.

The West Branch rises on the northern slope of Bear Mountain in the southeastern part of the town of Rupert at an altitude of about 2,500 feet above sea level. It flows eastward about 2 miles, then turns and flows southeastward to near Manchester Center. The West Branch has a length of about 9 miles and a fall of 1,800 feet, of which 1,600 feet occurs in the first 2 miles.

Bourn Brook rises in Bourn Pond in the northeastern part of the town of Sunderland at an altitude of 2,500 feet above sea level. It flows somewhat east of north for about 2 miles and then takes a northwesterly course to its junction with the Batten Kill half a mile south of Manchester Center. Its length is about 6 miles and fall about 1,800 feet of which 1,300 feet of drop occurs within 1 ½ miles in the middle of its course.

Lye Brook rises in Lye Brook Meadows in the northeastern part of Sunderland at an elevation of 2,640 feet above sea level. It flows in a northerly direction about 5 miles, then turns abruptly and flows southwestward to its junction with the Batten Kill. Its length is 6 ½ miles and its fall is 1,900 feet of which 1,800 feet occurs in the northward flowing stretch.

Mill Brook rises near the center of Sunderland at an altitude of 2,550 feet above sea level and flows southwestward, westward and northwestward to its junction with the Batten Kill at Sunderland. Its length is approximately 4 ½ miles and its fall about 1,920 feet, of which 1,600 feet occurs within 2 ½ miles of the head of the stream.

The Batten Kill Watershed (cont.)

Roaring Branch originates at the junction of Branch Pond Brook and Alder Brook west of Kelly Stand. It is approximately 10 miles long and flows overall in a westerly direction with northerly and southerly jogs until the East Arlington area. Just north of East Arlington, Warm Brook joins Roaring Branch from the south. Roaring Branch continues north from there to join the Batten Kill.

The Green River rises in many forking branches on the western slopes of Bear Mountain in the towns of Sandgate and Manchester at an altitude of nearly 3,000 feet above sea level. It flows southwestward to Sandgate then takes a more southerly course to its junction with the Batten Kill in West Arlington. Its length is about 10 miles with a total fall of 2,400 feet from source of highest tributary to the mouth.

The Vermont DEC inventory identifies 18 lakes and ponds covering 259 acres in the Batten Kill watershed.

The dominant land cover type in the Vermont portion of the Batten Kill watershed is forest - 82% of the watershed area. The second greatest land use is agriculture with about 7% of the watershed in that category. Surface water covers a little over 4% of the watershed area and wetlands cover another 2.7%. Developed land, including transportation, occupies at least 4.1% of the watershed land area.

Table 1. Land Use and Land Cover in the Batten Kill Watershed[1]

Land Use	Acres	% of Total
Forested	113,046.4	81.7
Agriculture	9,772.8	7.1
Surface Water	5,798.1	4.2
Transportation	3,995.9	2.9
Wetlands	3,685.3	2.7
Developed Land[2]	1,704.0	1.2
Old Field & Barren	423.8	0.3
Total:	138,426.3	100

1 Vermont Land Cover Classification Project, 1997 (based on satellite photographs from 1991 - 1993).

2 Developed land = residential, commercial, industrial but not transportation, which is listed separately.

Uses, Values and Features of the Batten Kill and Tributaries

Waterfalls, cascades and gorges

The only site listed in the 1985 *Waterfalls, Cascades, and Gorges of Vermont* inventory and study for the Batten Kill watershed is Downer Glen on Bourn Brook in Manchester. This site, however, was not visited by the investigators for that inventory and so there is no description of it. A site on Roaring Branch was sought but not found during this study; however, during the later swimming hole study, a nice series of cascades and pools was found on this stream (see below) and is probably the original site sought.

Swimming, fishing and boating

Four swimming holes are listed in the 1992 *Vermont Swimming Hole Study* for the Batten Kill watershed: three are on the Batten Kill itself and one is on Roaring Branch. One of the sites on the Kill is the Wagon Wheel Campground swimming hole, which is accessible to guests at the campground. The river is wooded and shady on both sides and there are shallow pools, instream boulders, small rapids, and a gravel bar. The second site on the Batten Kill itself is just west of Arlington off of River Road. The parking area and grassy riverbank belongs to Batten Kill Canoe but the public has been allowed access for swimming and fishing. There is a long, fairly deep pool there. The third site on the river is at the West Arlington covered bridge and is "the most popular swimming area on the Vermont segment of the Batten Kill." There is a large deep pool, good public access, a small beach, some grassy banks, and good fishing from the bridge piers.

The other identified swimming hole in the Batten Kill watershed was Roaring Branch Cascade in Sunderland. This site is a series of pools and cascades with clean water, natural vegetation, and carved rocks.

A stretch of the Batten Kill is listed in the 1989 *Whitewaters Rivers of Vermont* report due to some short stretches of Class I and II rapids. Class II rapids are found in a quarter-mile stretch below where Roaring Branch comes in. Below the Route 313 bridge in Arlington, the river is largely quickwater with occasional Class I rapids. From Arlington to the New York line, the Batten Kill is heavily used for recreational boating and tubing.

Fishing is the reason that the Batten Kill is a nationally known river. In 1989, Trout Unlimited named the Batten Kill as one of the nation's 100 best trout streams. The river was Vermont's first Outstanding Resource Water and its "exceptional fishery" due to the high quality habitat was a large part of the reason that the Batten Kill received ORW status. Its reputation for fishing has depended on the wild self-sustaining brown trout population that in the 1990s began a substantial decline. Studies are underway in attempts to determine the factors that may have contributed to the fishery decline.

Significant natural communities

An inventory of significant calcareous fens and riverside seeps done by the Vermont Nongame and Natural Heritage Program found two rich fen communities and one intermediate fen community in the Batten Kill watershed. The two rich fens are located in Manchester: one is a small (1.5 acre) wetland, of which a portion is rich fen, and the other is a relatively large, mostly open fen with a diversity of vegetation types and a large population of a globally rare sedge. A two-acre intermediate fen is found in Shaftsbury and an uncommon water sedge grows there.

Outstanding Resource Water status

On January 8, 1991, the Vermont Water Resources Board designated all Vermont portions of the Batten Kill mainstem and the West Branch of the Batten Kill as Outstanding Resource Waters. They were designated for their exceptional natural, recreational, cultural, and scenic values. The findings of fact and conclusions of law present the case for a "high quality trout stream" due to physical and chemical qualities and a river that provides "exceptional wildlife habitat" with its productive floodplain, intact riparian zone in many places, north-south orientation for migratory birds, slow-moving waters for furbearers, and thriving food chains that begin with aquatic insects and trout.

The case is also made through the ORW designation for the exceptional recreational values including angling and canoeing. Access, aesthetics, a good fishery, and enough water in summer all contribute to the heavy use of the river for recreation. Scenic and cultural values are also presented in the ORW petition.

Lakes with Special Significance or Features

Vermont DEC's Lake Protection Classification System is one framework within which lakes can be evaluated for their special significance when compared to other lakes statewide. The Classification System identifies unique lakes based on: wilderness status; occurrence of scenic and natural features; existence of very high water quality; and/or the presence of very rare, threatened, and/or endangered species. In the Batten Kill watershed, two ponds out of eighteen in the DEC assessment database are significant for these reasons.

Branch Pond, Sunderland: This pond may be the best example of a wilderness-like pond. The pond is undeveloped, essentially in a primitive state, but is relatively easily accessed. The pond supports two noteworthy aquatic plants, the rare pondweed *Potamogeton confervoides*, and the rare bladderwort *Utricularia geminiscapa*.

Bourn Pond, Sunderland: This is a true wilderness pond with an attractive Sphagnum mat floating island. The pond supports populations of two noteworthy aquatic plants, the rare pondweed *Potamogeton confervoides* and the rare burreed *Sparganium fluctuans*. Bourn Pond is critical habitat for breeding common loons.

Water-Related Activities or Projects in the Batten Kill Watershed

Batten Kill Watershed Alliance

The Batten Kill Watershed Alliance was established in May 2001 to coordinate, educate, and promote the stewardship and enhancement of the Batten Kill watershed in New York and Vermont. Its board represents a balance of watershed interests including farming and forestry, recreation and sporting, local government, conservation organizations, landowners, and the business community. The Alliance's first executive director was hired in May 2002. In the near future, the Alliance intends to reach out to local government officials in both states; produce membership materials and increase membership; hold public meetings on a variety of watershed themes; and produce a long-range plan. Themes of interest include stream stability, roads and rivers, recreational conflict, forest and wildlife corridor fragmentation, stocking, landowner rights and responsibilities, and others.

Batten Kill Study Team

A team of state and federal fishery and aquatic biologists was established in late 1999 in order to investigate possible causes of the brown fishery decline in the Batten Kill. Fourteen possible factors for the decline were identified for investigation at the first meeting of the team. In July 2000, Senator James Jeffords announced a $200,000 appropriation to the U.S. Forest Service - Green Mountain National Forest for habitat restoration and resource assessments of the Batten Kill. A number of studies, inventories, and assessments are now underway as a result of the team's efforts and the federal appropriation. The GMNF and Forest Service research have been working on assessing fine sediments in trout spawning gravels and its potential impacts on reproduction. GMNF fishery biologists also did a redd (fish nest) survey on four Batten Kill tributaries in fall 2001. Significant spawning was documented in the lowest 2 miles of the Green River.

Information on the studies being conducted on the Batten Kill and the results of those investigations can be found in issues of the *Batten Kill News*, a newsletter produced twice a year by the Vermont Department of Fish and Wildlife. Fish population survey results, temperature monitoring results, habitat assessment work, and informational website addresses have all been featured in past issues.

Bennington County Regional Planning Commission

The Bennington County Regional Planning Commission has done an inventory and located all the culverts and catch basins along public roads in Arlington, Sandgate, and Sunderland. During the process, the Commission identified those structures at risk of failure and the results of their findings will be shared with the towns and the Batten Kill Study Team.

Bennington County Conservation District

The Bennington County Conservation District has served as project coordinator on several riparian projects beginning in 1999. With its partners, the U.S. Forest Service, the U.S. Fish & Wildlife Service's Partners for Wildlife Program, the Vermont Department of Fish & Wildlife, the Southwestern Vermont Chapter of Trout Unlimited, the town of Arlington and landowners and businesses in the watershed, the District used natural channel design techniques on a 300-foot project in Manchester, a 200-foot project in West Arlington and a 300-foot project in Arlington. A project on the Green River in Arlington is in the works for the 2002 field season.

The Conservation District also conducted a buffer outreach program, "Better Buffers for the Batten Kill" for two years. The program included an educational and outreach component with a pamphlet, press releases and presentations as well as a hands-on buffer planting component. Arlington high school students helped landowners plant free native trees and shrubs along the banks of the Batten Kill in the spring of 2002 as part of this effort.

Batten Kill Conservancy - New York

There are two Batten Kill Conservancy organizations, one in New York and one in Vermont. The Batten Kill Conservancy - New York is a private, not-for-profit 501(c)(3) organization that does public education, monitoring through River Network, and land conservation work in the Batten Kill watershed in New York. They produce a newsletter *Voice of the River.*

Batten Kill Conservancy - Vermont

The Batten Kill Conservancy - Vermont based in Arlington is dedicated to the conservation and protection of the Batten Kill. Past activities have included facilitating easements and purchases to protect key pieces of the Batten Kill. The current focus of the group is to contribute to solving the problems of the trout fishery by improving the riparian habitat. The Conservancy has been involved in an erosion control project at the covered bridge in West Arlington and in a project evaluating two large eroding cliffs in Manchester and Arlington.

Bennington and Rutland County Resource Assessment

A local working group consisting of representatives from the Rutland County Natural Resources Conservation District (NRCD), the Bennington County Conservation District, the Poultney-Mettawee NRCD, the Natural Resources Conservation Service (NRCS), the Farm Services Agency, and the county foresters conducted a resource assessment of both Bennington and Rutland counties. The Hoosic, Walloomsac, and Batten Kill are all within Bennington County. The resource assessment inventoried and discussed issues relating to agriculture, forestry, recreation, water resources, and wildlife conservation. The report contains useful information for interested citizens, watershed groups, and resource managers. It is available from the Rutland County NRCD.

The Walloomsac River Watershed

The Walloomsac River watershed drains much of the southcentral portions of Bennington County being bounded by the Batten Kill watershed on the north and the upper Hoosic River watershed on the south. Similar to the Batten Kill, the headwaters of the Walloomsac River are located in Vermont draining 139 square miles of the state before entering New York. The Walloomsac River is a significant tributary to the Hoosic River.

The Walloomsac River begins where South Stream and Jewett Brook join just south of Bennington village. The river winds through Bennington in a northwesterly direction. Just north of Bennington village, the Roaring Branch enters from the east. As a larger river now, the Walloomsac flows northwestward through the northwest portion of the town of Bennington then into New York and to Hoosic Junction where it joins the Hoosic River. In addition to South Stream and the Roaring Branch, the major direct tributaries in Vermont include Jewett Brook, Furnace Brook, Paran Creek, and Cold Spring Brook.

South Stream rises in the central portion of Pownal west of The Dome and flows west of north into and through a large wetland complex east of Barber Pond. From there it flows northerly through more wetland communities in the central and northern portion of Pownal. It then flows into the town of Bennington where the Roaring Branch joins it and its slope steepens. Just south of the village of Bennington, it meets Jewett Brook. This convergence forms the beginning of the Walloomsac River. Its major tributary is Roaring Branch, which begins in the town of Stamford, flows through a narrow, steep valley and joins South Stream just as it enters Bennington.

Jewett Brook originates near Pownal Center and flows northerly and easterly meandering through numerous wetland communities including shrub and forested swamps as well as marshes until it joins South Stream south of the village of Bennington. Its length is 8 miles and its drop in elevation is 1,150 feet.

The Roaring Branch of the Walloomsac River originates in Woodford Hollow where Bolles Brook and City Stream meet. These two streams and Bickford Hollow Brook are the largest contributors to the Roaring Branch. Bickford Hollow Brook and Bolles Brook originate in the Green Mountains in the western part of Glastenbury and flow south into Roaring Branch. City Stream rises in Big Pond (also known as Woodford Lake), which is north of Prospect Mountain, at an altitude of 2,263 feet. It flows south, west, and northwest through central Woodford into the Roaring Branch of Walloomsac River. Its length is 5 ½ miles and its drop in elevation is 1,093 feet.

Furnace Brook originates in northeastern Shaftsbury, south of Maple Hill, at an elevation of 1,520 feet. Its chief tributaries are Basin and Stratton Brooks, which flow off the western side of the Green Mountains and flow in an easterly direction until joining Furnace Brook. Furnace Brook is 10 miles long with a fall of 940 feet.

The Walloomsac River Watershed (cont.)

Paran Creek rises in the northeastern part of Shaftsbury, west of Trumbull Mountain. It flows southwesterly through Shaftsbury; is dammed to form Lake Paran; and below Lake Paran flows west and south through several other dams to North Bennington, where it joins the Walloomsac River. A large branch that rises on West Mountain joins Paran Creek near South Shaftsbury. Its length is 8 miles and its fall is 860 feet.

Little White Creek, also sometimes known as Shaftsbury Hollow Brook, rises in the southwestern part of Arlington, south of Grass Mountain, at an altitude of 2,450 feet. It flows southward and southwestward across the northwestern part of Shaftsbury and then through southeastern White Creek, New York. It joins the Walloomsac River near North Hoosick, New York. Its length is 13 miles and it has a drop in elevation of 2,050 feet, of which about 1,500 feet occurs in the 3 ½ miles of the steam above the New York-Vermont state line.

The Vermont DEC inventory has 6 lakes covering 193 acres in the Walloomsac watershed.

The dominant land cover type in the Vermont portion of the Walloomsac River watershed according to satellite photography from the early 1990s is forest with 71% of the total watershed area as coniferous, deciduous or mixed forest. Approximately 12% of the watershed is in some type of agricultural land use. Surface waters cover almost 5% of the watershed with wetlands about 3 ½ %. Developed lands, including transportation, is close to 9% of the watershed area. The paved, developed area of Bennington village accounts for a large portion of the 9%. Table 2 below contains the acres and percentages of each land use or land cover in the watershed based on satellite photograph analysis.

Table 2. Land Use and Land Cover in the Walloomsac River Watershed[1]

Land Use	Acres	% of Total
Forested	61,509.5	70.7
Agriculture	10,263.2	11.8
Surface Water	4,172.2	4.8
Developed Land[2]	3,918.1	4.5
Transportation	3,770.0	4.3
Wetlands	3,015.3	3.5
Old Field & Barren	324.4	0.4
Total:	86,972.7	100

1 Vermont Land Cover Classification Project, 1997 (based on satellite photographs from 1991 - 1993).
2 Developed land = residential, commercial, industrial but not transportation, which is listed separately.

Uses, Values and Features of the Walloomsac River and Tributaries

Waterfalls, cascades and gorges

No waterfalls or cascades were reported in the *Waterfalls, Cascades and Gorges* report done for Vermont DEC. However, a small stretch where the stream cascades over ledges was observed on South Stream above and below the Coleville Road bridge.

Swimming, fishing, and boating

No swimming sites are named in the 1992 *Vermont Swimming Hole Study* for the Walloomsac and its tributaries. It is likely that the urban nature of the river for much of its course in Vermont plus the size and character (winding wetland streams) of some of its tributaries accounts for some of the lack of use.

A well-used fishing spot on the Walloomsac River is at Henry Bridge, a covered bridge just upstream of the Bennington Wastewater Treatment Facility. Old bridge piers make a good place for sitting and casting. Two anglers reported that good-sized trout can be caught in South Stream upstream of the fish hatchery.

The Appalachian Mountain Club River Guide describes a mostly flatwater paddle down the Walloomsac from Bennington to Walloomsac Village, New York. There are two dams around which to portage but the trip is described as a "delightful paddle through beautiful and historic terrain."

Significant natural communities

Four sites from the Walloomsac River watershed were described in the Vermont Department of Fish and Wildlife study of significant calcareous fens and riverside seeps. One site identified is Pownal Bog north of Barber Pond, which is actually a fen community and not a bog. Six rare plants occur at the site as well as four uncommon plants and a rare moss. This two and a half acre peatland has formed in a kettlehole depression. Another small intermediate fen was briefly surveyed in Pownal although it seemed to be a transitional site and so its significance is not known.

The other two sites in the Walloomsac River watershed were found in Shaftsbury. Paran Creek Fen located south of Simeon Dean Road consists of two small rich fens that contain a population of a globally rare sedge. Serendipity Fen is a one-acre fen within a 100-acre plus wetland. It is a rich fen and also has the globally rare sedge in it.

Lakes with Special Significance or Features

Vermont DEC's Lake Protection Classification System identifies unique lakes based on: wilderness status; occurrence of scenic and natural features; existence of very high water quality; and/or the presence of very rare, threatened, and/or endangered species. In the Walloomsac watershed, two ponds are significant for these reasons.

Big Pond, Woodford: This pond supports one rare plant species, *Littorella americana*, which is a low-growing aquatic plant of shallow waters.

Lake Hancock (a.k.a. Sucker Pond), Stamford: This is a wilderness-like lake with difficult vehicular access.

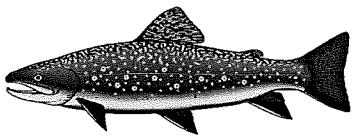
Activities or Projects in the Walloomsac River Watershed

Walloomsac Watershed Stream Stability Assessment

The Bennington County Conservation District and the Hoosic River Watershed Association are undertaking a stream stability assessment of several river and stream segments in the Walloomsac River watershed. The assessment includes separate qualitative and quantitative methods. The qualitative assessment visually assesses and scores five erosion-related parameters on much of the Walloomsac River mainstem in Bennington and downstream sections of Roaring Branch, South Stream, and Furnace Brook. The quantitative assessment is documenting geomorphological characteristics including width:depth ratio, bankfull channel depth, channel sinuosity, and pool:riffle spacing.

Green Mountain National Forest Research

With over 29,000 acres of the Walloomsac River watershed as National Forest land, Green Mountain National Forest (GMNF) fishery biologists have a strong interest in the fish populations and aquatic habitat of a number of the streams in the watershed. The GMNF has conducted stream habitat and fish population surveys in the mainstem Walloomsac River, City Stream, Bolles, Bickford and Stamford Streams. They have longterm monitoring sites in Bolles and Bickford Brooks for tracking fish habitat and population trends.



The Hoosic River Watershed

The Hoosic River has its source about 2 miles northwest of Dalton, Massachusetts at an elevation of 1,500 feet above sea level. It flows through the extreme southwest corner of Vermont where it drains a small portion of southern Bennington County, an area of approximately 89 square miles. The Vermont tributaries have narrow watersheds and drain the steep slopes of the Green Mountain Range for the most part.

The country drained is to a great extent rugged and mountainous, the summits of the Taghkanick and Petersburg ranges attaining elevations of 1,000 to 2,000 feet above sea level, and the Ragged Mountains, south of North Adams, culminating in Mount Greylock at 3,505 feet above sea level. The immediate valley of the Hoosic comprises a moderately hilly, open country, which is good farm land, and is well cultivated.

The North Branch of the Hoosic River rises in the town of Stamford south of Heartwellville, Vermont and flows southwestward to the city of North Adams, Massachusetts where it joins Hoosic River. Its length is 11 miles. Its principal tributary in Vermont is Roaring Brook. A number of small tributaries also flow down from the mountainsides of the Hoosic Range of the Green Mountains to join the North Branch.

Forested land dominates in the Vermont portion of the Hoosic River watershed with over 77% of the area comprised of this land cover type. Agricultural land use accounts for approximately 11% of the watershed with most identified as hayland or pasture. Surface water covers almost 6% of the watershed with wetlands only about 1%. Developed land, including transportation uses, accounts for about 4.2% of the watershed area.

Table 3. Land Use and Land Cover in the Hoosic River Watershed[1]

Land Use	Acres	% of Total
Forested	36,376.3	77.6
Agriculture	5,153.0	11.0
Surface Water	2,719.3	5.8
Transportation	1,577.4	3.4
Wetlands	558.8	1.2
Developed Land[2]	369.6	0.8
Old Field & Barren	95.7	0.2
Total:	46,850.1	100

1 Vermont Land Cover Classification Project, 1997 (based on satellite photographs from 1991 - 1993).

2 Developed land = residential, commercial, industrial but not transportation, which is listed separately.

Uses, Values and Features of the Hoosic River and Tributaries

Waterfalls, Cascades and Gorges

The *Waterfalls, Cascades and Gorges* inventory and study described one cascade for the watershed. Roaring Brook Cascade on Roaring Brook, which is a tributary to the North Branch of the Hoosic River, is a small cascade in the town of Stamford. The feature is about 75 to 100 feet long by 15 feet wide with a total drop of about 20 feet. The investigator considered it a small but pretty site.

Swimming and Boating

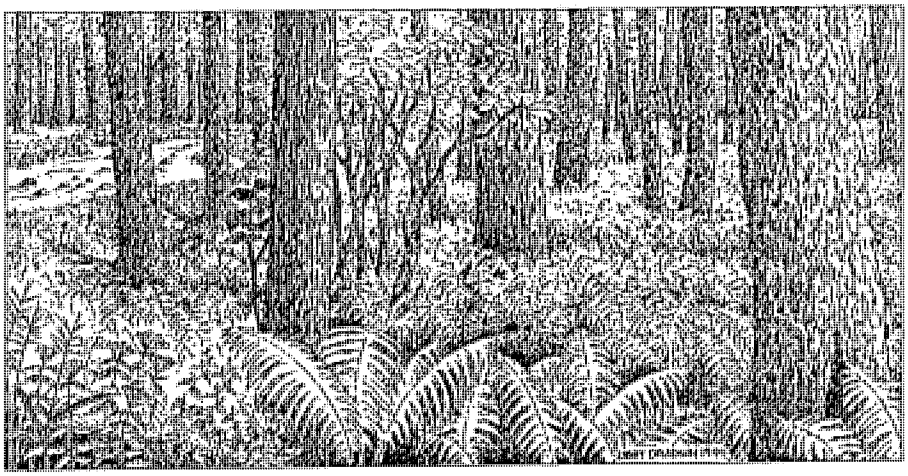
The Hoosic River basin has very few swimming sites according to the *Vermont Swimming Hole Study*: the mainstem has poor water quality and the tributaries are generally too small and shallow for swimming holes. Of the two known sites on Tubbs Brook mentioned in the study, one was on posted private property and the other is known to receive light to moderate use.

The Appalachian Mountain Club River Guide describes two canoeing stretches on the Hoosic River that include the portion of the river in Vermont. One stretch from North Adams, Massachusetts below the last dam to North Pownal, Vermont, including a portage around the North Pownal dam is smooth with only occasional rapids. The other stretch from North Pownal, Vermont to Hoosick Falls, New York is described as a "pleasant run through farming country" that includes a "few easy riffles."

Significant natural communities

No lakes with special significance or features have been identified in the Hoosic watershed.

A high quality stretch of riverine floodplain forest and one of the very few floodplain forest remaining in southwestern Vermont is located on the hairpin bend in the Hoosic River below North Pownal. The floodplain forest occupies about 25 acres and consists of both sugar maple-basswood-ostrich fern type and successional floodplain forest.



Activities or Projects in the Hoosic River Watershed

Pownal Tannery Site Remediations

There has been much investigation, assessment, monitoring and other activity and hundreds of millions of dollars spent on the Pownal Tannery site along the Hoosic River. The former tannery building has been decontaminated and taken down. The landfill that received sludge from the lagoons has been graded and capped. About 2500 cubic yards of contaminated fill has been removed from the Woods Road Disposal Area and the area has been graded. Rip-rap was put in place along the edge of the Hoosic River where the disposal area meets it. At the lagoon area, the clarifier and press buildings were removed. Sludge with metals (arsenic, lead, other) and other toxics remain in lagoon 1 and 5. Lagoons 2, 3a, 3b and 4 have been cleaned out. The lagoon area is the site of the proposed wastewater treatment facility for Pownal. Sediment testing in the vicinity of the tannery site (about 2.5 miles upstream, adjacent to, and downstream) found PCB concentrations from non-detect to 0.041 mg/kg. The site specific human health risk exposure level calculated for the site by EPA assuming an intensive recreational use by all ages was 0.000021 mg/kg. The Ontario Ministry of Environment default sediment concentrations for risk to aquatic organisms is 0.00001 mg/kg.

Pownal Wastewater Treatment Facility Planning

A wastewater facilities planning report done for the Town of Pownal in 2000, updated March 2002, documents the direct sewage discharges and failed septic systems that are polluting the Hoosic River. Three pipes from 17 homes discharge raw sewage to the Hoosic; surfacing effluent from over 80 mobile homes makes its way through drainage ditches and a stream to the Hoosic; and surfacing effluent from 2 other homes and an apartment building also go to a stream then the Hoosic. In addition to these failures that go to the Hoosic River, there are a number of sources of untreated wastewater to Jewett Brook which flows north to the Walloomsac: Royal Pine Villa Mobile Home Park, the Cozy Meadows Mobile Home Park, Pownal Elementary School, and a home where an overflow pipe goes to a wetland that flows to the brook.

After more than a decade of various failures and temporary fixes, the town of Pownal with the help of consulting engineers, the state DEC Wastewater Management Division and other state and federal officials came up with a plan to build a wastewater management system. The system consists of collection sewers in Pownal Village, Pownal Center, and North Pownal with a secondary wastewater treatment facility in North Pownal. The treated discharge is to the Hoosic River.

Basin 1 River and Stream Assessment

The assessment of Basin 1 rivers and streams involves identification of those miles where important uses and values of the waters are compromised by poor water quality or alterations. It also involves identification of the "causes" (specific pollutants or changes) and the "sources" (activity or land use) of the problem that result in less than full support of the uses. The assessment process also is used to identify waters and aquatic habitat in good condition as well as rivers and streams where Vermont DEC does not have enough information to determine the conditions of the waters and habitat.

Designated Use Support Status for Basin 1 Rivers and Streams

For each river use or value that is assessed, the miles of river or stream fully supported, fully supported but threatened, partially supported, or not supported are determined. For example, river miles that are fully supported for aquatic biota have macroinvertebrate and fish communities in good to excellent health and good physical habitat. River miles that are fully supported for swimming have no known high levels of *E. coli*, a bacteria that is used as an indicator for pathogens. The miles in each support category for seven uses or values: aquatic biota and/or habitat, contact recreation (swimming, tubing), secondary contact recreation (boating, fishing), aesthetics, drinking water supply, agricultural water supply and fish consumption are shown in Table 4 below.

The ability of the rivers and streams in this basin to support aquatic biota and habitat is very good with only about 14 miles identified as not fully supporting those uses. These 14 miles include all of the Hoosic River mainstem in Vermont and parts of Hewitt Brook, Lye Brook and Branch Pond Brook. Contact recreation (swimming, bathing) is not fully supported for 8.2 miles. This use is not supported on the Hoosic River and Jewett Brook where there are failed septic systems and straight pipes sending sewage to these waters and on Hewitt Brook below the Bennington Landfill where the surface waters and sediments have high levels of metals and PCBs. Secondary contact recreation is partially supported on the Hoosic and not supported on Hewitt Brook. Aesthetics are partially supported on the Hoosic and Jewett Brook. Drinking and agricultural water supplies are not supported on Hewitt Brook. Fish consumption is not supported on the Hoosic River mainstem and this use is threatened on all other miles because of elevated levels of mercury in fish tissue. There is a statewide fish consumption advisory due to this pollutant in surface waters and the food chain.

Table 4. Use Support Status for Basin 1 Rivers and Streams

Use	Miles of full support	Miles threatened	Miles of partial support	Miles of non-support	Miles not assessed
Aquatic biota/habitat	178.9	45.3	10.8	4.7	24.6
Contact recreation	218.7	12.8	8.0	0.2	24.6
Secondary contact recreation	190.7	40.0	8.8	0.2	24.6
Aesthetics	196.6	35.1	8.0	0	24.6
Drinking water supply	104.3	7.2	0	0.2	152.6
Agricultural water supply	104.3	7.2	0	0.2	152.6
Fish consumption	0	257.3	0	7.0	0

Causes and Sources of Impacts & Threats to Basin 1 Rivers and Streams

Nutrients and pathogens are the primary causes of impacts to rivers and streams in the basin. These come from the problematic or nonexistent onsite wastewater systems that overflow or discharge to wetlands and streams in the basin. Metals are the third greatest cause of impact in the basin and affect the Hoosic River and Hewitt Brook. The fourth greatest cause is pH from acid deposition. These causes and others are shown in Table 5 below.

Table 5. Causes of Impacts and Threats to Basin 1 Rivers and Streams

Cause or pollutant	Miles of high impact	Miles with moderate impact	Total miles of impact	Miles threatened
Nutrients	0	8.0	8.0	12.2
Pathogens	1.0	7.0	8.0	0
Metals	0.2	7.0	7.2	0.3
pH	4.5	2.0	6.5	9.0
Habitat alterations	0	1.8	1.8	28.6
Sedimentation	0	0.3	0.3	34.7
Thermal modification	0	0	0	20.0

Sedimentation, habitat alterations and thermal modifications threaten quite a few miles. It is likely that these threats are actually having an impact on some portion of these Basin 1 rivers and streams but the impact is not clearly documented at this time.The GMNF and Forest Service Research team have been working on assessing fine sediments in trout spawning gravels in the Batten Kill and its potential impacts on reproduction. Preliminary results based on two years of work indicate that about 40% of the sites evaluated are over the threshold for negative effects on hatching and incubation. Further assessment of these causes and other conditions or activities are especially important to pursue on the Batten Kill mainstem and Walloomsac River mainstem.

Sources having an impact on some river or stream miles include failed onsite wastewater systems, hazardous waste, atmospheric deposition and streambank de-stabilization. Removal of riparian vegetation, developed land and road/bridge runoff, and some agricultural activities all threaten some of the river or stream water uses. Sources of impacts and threats to Basin 1 rivers and streams are listed in Table 6 below with the miles currently known to be affected.

Table 6. Sources of Impacts and Threats to Basin 1 Rivers and Streams

Source	Miles of high impact	Miles with moderate impacts	Total miles of impact	Miles threatened
Onsite wastewater systems	1.0	7.0	8.0	0
Hazardous waste	7.0	0	7.0	0
In-place contaminants	0	7.0	7.0	0.1
Atmospheric deposition	4.5	2.0	6.5	9.0
Streambank de-stabilization	0	1.8	1.8	21.0
Removal of riparian vegetation	0	0	0	21.5
Urban/developed land runoff	0	0	0	16.0
Agricultural activities	0	0	0	15.2
Road/bridge runoff	0	0	0	8.0
Golf courses	0	0	0	4.0

Basin 1 Lake and Pond Assessment

Designated Use Support Status for Basin 1 Lakes

Overall, there are 96 lake acres in these drainages which only partially support one or more uses, and 83 acres where one or more uses are not supported. All designated uses are fully supported on 80 assessed lake and pond acres. All acres are assessed for at least one use. Table 7 provides an accounting of lake acres where designated uses are supported, threatened, or not fully supported.

Table 7. Use Support of Basin Lakes and Ponds (in acres)

Use	Full Support of Uses	Full Support but Threatened	Partial Support of Uses	Non-Support of Uses	Acres Not Assessed
Overall Uses	80	193	96	83	0
Aesthetics	248	164	40	0	0
Aquatic Life Use Support	80	193	96	83	0
Agricultural Water Supply	0	0	0	0	452
Drinking Water Supply	0	0	0	0	51
Fish Consumption	452	0	0	0	0
Secondary Contact Uses	267	94	40	0	51
Swimming Uses	240	121	40	0	51

Causes and Sources of Impacts and Threats to Basin 1 Lakes and Ponds

Impairments to lakes in this basin are related to acidification (6 lakes, 139 acres), and to the presence of non-native nuisance aquatic species (1 lake, 40 acres). Threats to uses are also caused by siltation (128 acres), exotic species (99 acres), pH (82 acres), nutrients and phosphorus (60 acres), turbidity (51 acres), and the presence of algae (40 acres). Table 8 provides an accounting of the causes of impairments and threats to lakes in this drainage system.

Table 8. Causes of Impacts and Threats to Basin 1 Lakes and Ponds (in acres)

Cause of Impact	High	Med	Low	Total	Threatened
900 Nutrients	0	0	0	0	60
1000 pH	139	0	0	139	82
1100 Siltation	0	0	0	0	128
2210 Noxious aquatic plants - Algae	0	0	0	0	40
2500 Turbidity	0	0	0	0	51
2600 Exotic Species	40	0	0	40	99

The following sources impair or threaten lake uses in the Batten Kill, Walloomsac, and Hoosic watersheds. Atmospheric deposition of acids, as well as natural susceptibility to low pH is responsible for the acidification of 139 acres and threats to an additional 82 acres. Recreational boating and the associated release of non-native plant propagules is a primary source of the impairment of 40 acres due to the presence of these species, and threatens an additional 99 acres. Other important threats include road runoff and development. Table 9 lists the sources of impairment and threats to lakes in this basin.

Table 9. Sources of Impacts and Threats to Basin 1 Lakes and Ponds

Source of Impact	High	Moderate	Low	Total	Threat
3200 Land Development	0	0	0	0	52
7000 HYDROMODIFICATION	0	0	0	0	8
7700 Streambank Modification/Destabilization	0	0	0	0	5
7910 Recreational Boating: In-Water releases	0	40	0	40	99
8100 Atmospheric deposition	139	0	0	139	82
8300 Road Maintenance and runoff	0	0	0	0	75
8600 NATURAL SOURCES	8	69	62	139	122
9000 SOURCE UNKNOWN	0	0	0	0	27

A summary of overall use support by individual lake (Table 10) provides useful information about lakes in the Batten Kill, Walloomsac, and Hoosic watersheds. The paragraphs following the table describe impacts and major threats to specific lakes.

Table 10. Overall Use Support by Individual Lake in Basin 1 (in acres)

Lake Name	Lake Area (ac)	Last Assessed (YYYYMM)	Assess-ment Type	Full Support	Full Support but Threatened	Partial Support	Non-Support
BARBER	19	200110	Evaluated	0	19	0	0
BARBOS	7	200110	Evaluated	7	0	0	0
BEEBE (SUNDLD)	8	200110	Evaluated	0	0	8	0
BIG	31	200110	Monitored	0	31	0	0
BOURN	48	200110	Monitored	0	0	48	0
BRANCH	34	200110	Monitored	0	0	0	34
BULLHEAD (MANCHR)	5	200110	Evaluated	5	0	0	0
DUFRESNE	8	200110	Evaluated	0	8	0	0
EQUINOX	15	200110	Evaluated	15	0	0	0
HANCOCK (STAMFD)	51	200110	Evaluated	0	51	0	0
HOPPER	1	200110	Evaluated	1	0	0	0
KENT HOLLOW;	10	200110	Evaluated	10	0	0	0
LITTLE MUD (WINHLL)	21	200110	Evaluated	0	0	0	21
LOST (SUNDLD)	2	200110	Evaluated	2	0	0	0
LYE BROOK-N;	10	200110	Monitored	0	0	0	10
LYE BROOK-S;	18	200110	Evaluated	0	0	0	18
MADELEINE	20	200110	Evaluated	20	0	0	0
MILLER;	11	200110	Evaluated	11	0	0	0
PARAN	40	200110	Monitored	0	0	40	0
PICKEREL	9	200110	Evaluated	9	0	0	0
SHAFTSBURY	27	200110	Monitored	0	27	0	0
SOUTH STREAM	24	200110	Evaluated	0	24	0	0
SOUTH VILLAGE	5	200110	Evaluated	0	5	0	0
THOMPSONS	28	200110	Evaluated	0	28	0	0

Note that the use of a semi-colon (;) after the pond name denotes a water for which Vermont DEC has established a name based on USGS topographic map features. These names were established for tracking purposes, and may not reflect local pond names.

Barber Pond: This pond is threatened by sedimentation due to erosion from construction sites and dirt roads in its watershed.

Beebe Pond, Bourn Pond, Branch Pond, Lye Brook Ponds N and S (all in Sunderland), Little Mud Pond (Winhall): These ponds are all impaired due to acidification. Beebe and Bourn Ponds are considered only episodically acidified, while the remaining ponds are chronically acidic.

Big Pond, Woodford: This pond is threatened by acidification, by its proximity to milfoil-infested waterbodies, and due to small nearshore erosion sites.

Dufresne Pond, Manchester: This is a small impoundment created by a dam. It continues to trap sediments derived from upper portions of the watershed. This sedimentation, an unavoidable consequence of the impoundment itself, threatens aquatic life and swimming uses.

Lake Hancock, Stamford: This 51-acre remote lake is threatened by acidification due to natural acid sensitivity as well as atmospheric deposition.

Lake Shaftsbury, Shaftsbury: This 27-acre recreational lake may be threatened by nutrients, however, further assessment is needed.

South Stream Pond, Pownal: This 24-acre pond is threatened by the potential infestation of Eurasian watermilfoil due to the proximity of existing infestations in other lakes.

South Village Pond, Dorset: This small 5-acre pond may be threatened by development practices on the surrounding shoreline.

Thompsons Pond, Pownal: This 28-acre pond is threatened by the potential infestation of Eurasian watermilfoil due to the proximity of existing infestations in other lakes. There are also poorly substantiated threats attributed to general development near the pond. Further assessment is needed.

Lakes in Basin 1 that Need Further Assessment

There are 10 lakes and ponds in this drainage system identified as needing further assessment at this time. A summary of information from the Lake Assessment database is provided below. There are several very small ponds (less than 10 acres in size) in the basin for which Vermont DEC has little or no information. The accessibility of all of these smaller lakes to the public is unknown.

Barber Pond, Pownal: Assessment is needed to determine if sedimentation is having an impact on this pond.

Equinox Pond, Manchester: Vermont DEC has no information nor data on this pond, which should be reassessed during the next Basin 1 assessment cycle.

Lake Hancock, Stamford: The degree to which off-road vehicles is causing sedimentation at the access should be established. The lake was last visited by Vermont DEC in 1989.

Kent Hollow Pond, Sandgate: The question of whether this remote waterbody is a pond or simply a forested wetland remains unanswered. A site visit is necessary to determine the exact nature of this pond.

Little Mud Pond, Winhall: This pond should be reassessed for acidification.

Lake Madeleine, Sandgate: This pond has not been visited by Vermont DEC since the mid-1980's. It is presently posted against public access.

Miller Pond, Arlington: This marshy pond is thought to be of extremely high wildlife value, and a follow-up visit to verify this is in order.

Shaftsbury Lake, Shaftsbury: An assessment of trophic status is warranted on this recreational lake.

South Stream Pond, Pownal: This is another waterbody for which there is an unanswered question as to whether it is a pond or wetland.

Thompsons Pond, Pownal: This lake was last visited by Vermont DEC in 1989. Assessment for trophic status and use support is warranted.

Municipal Discharges in Basin 1

Two municipal wastewater treatment facilities (WWTF) discharge treated effluent to waters of Basin 1. The Bennington WWTF discharges to the Walloomsac River and the Manchester WWTF discharges to the Batten Kill. The Pownal WWTF is in the planning stage and will treat wastewater from the three growth centers in Pownal discharging to the Hoosic River.

Table 12. Municipal Wastewater Treatment Facilities in Basin 1

WWTF	WBID	Receiving Water	Permitted flow (gallons/day)	Annual Average Flow (gallons/day)
Bennington	VT01-03	Walloomsac River	5,100,000	3,605,800
Manchester	VT01-04	Batten Kill	600,000	260,000

303(d) Impaired Waters in Basin 1

There are eight waterbodies in the basin that are listed on the Vermont Year 2000 List of Impaired Surface Waters. Impaired surface waters are those where chemical, physical or biological data gathered from monitoring shows a violation of one or more Vermont Water Quality Standards criteria. The Year 2002 list is in draft form and there are few changes proposed for Basin 1 waters.

Table 13. 303(d) Impaired Waters in Basin 1

Waterbody ID	Segment	Pollutant	Problem
VT01-02	Hoosic River - all 7 miles in Vermont	PCBs	PCBs in brown trout - consumption advisory
VT01-02	Hoosic River - lowest 2 miles in Vermont	pathogens, organic enrichment	untreated domestic waste from failed or nonexistent septic systems in Pownal
VT01-05	Lye Brook - 2.5 miles above mouth to headwaters	pH	critically acidified, chronic
VT01-05L01	Bourn Pond	pH	extremely sensitive to acidification, episodic
VT01-05L11	Lye Brook - N	pH	critically acidified, chronic
VT01-05L12	Lye Brook - S	pH	critically acidified, chronic
VT01-06	Branch Pond Brook	pH	critically acidified, chronic
VT01-06L01	Branch Pond	pH	critically acidified, chronic
VT01-06L02	Beebe Pond	pH	extremely sensitive to acidification, episodic

References and Resources for Basin 1 Watersheds

1) *AMC River Guide: New Hampshire/Vermont*, Second Edition, 1989. Appalachian Mountain Club Books, Boston, Massachusetts.

2) *Battenkill, Walloomsac and Hoosic River Basins Water Quality Management Plan*, February 1976. Vermont Department of Water Resources, Montpelier, Vermont

3) *Calcareous Open Fens and Riverside Seeps of Vermont: Some Sites of Ecological Importance.* Elizabeth Thompson and Robert Popp, Vermont Nongame and Natural Heritage Program. March 1995.

4) *Floodplain Forests of Vermont: Some Sites of Ecological Significance*, July 1998. Eric Sorenson, Marc Lapin, Brett Engstrom, and Robert Popp for Nongame and Natural Heritage Program, Vermont Fish and Wildlife Department, Agency of Natural Resources, Waterbury, Vermont.

5) *Petition to Designate The Battenkill as an Outstanding Resource Water*, September 1989. Submitted by the Vermont Natural Resources Council and Trout Unlimited on behalf of the Signatories.

6) *State of Vermont Water Resources Board Findings of Fact, Conclusions of Law and Order* RE: Batten Kill, June 12, 1991.

7) *Town of Pownal, Vermont Wastewater Facilities Planning Preliminary Engineering Report*, August 2000, updated 2002. Forcier, Aldrich & Associates, Inc.

8) *Vermont Swimming Hole Study*, 1992. Jerry Jenkins, Deborah Benjamin, and Jane Dorney for Vermont DEC, Water Quality Division. Unpublished.

9) *Waterfalls, Cascades and Gorges of Vermont*, 1985. Jerry Jenkins & Peter Zika for the Vermont Department of Environmental Conservation and Department of Forests, Parks and Recreation.

10) *Whitewater Rivers of Vermont*, 1989. Jerry Jenkins for Vermont DEC.

Appendix A
Macroinvertebrate Sampling Sites of Basin 1
1992 - 1999

Table A.1. Basin 1 River or Stream Macroinvertebrate Sampling Sites 1992-1999

WBID	River or Stream	Town	Mile-point	Date	Assess-ment
VT01-03	Walloomsac River	Bennington	9.2	10/8/92	Good
VT01-03	Walloomsac River	Bennington	9.2	10/5/94	Good
VT01-03	Bickford Hollow Brook	Woodford	0.4	9/21/95	Good
VT01-03	Bickford Hollow Brook	Woodford	0.4	10/4/96	Good
VT01-04	Batten Kill	Arlington	34.9	10/8/92	Good
VT01-04	Batten Kill	Arlington	34.9	10/7/98	Excellent
VT01-04	Batten Kill	Manchester	48.2	10/7/98	Excellent
VT01-05	Lye Brook	Manchester	1.8	9/22/93	Excellent
VT01-05	Lye Brook	Manchester	1.8	9/19/94	Excellent
VT01-05	Lye Brook	Manchester	1.8	9/20/95	Excellent
VT01-05	Lye Brook	Manchester	3.4	9/22/93	Fair
VT01-05	Lye Brook	Manchester	3.4	9/19/94	Poor
VT01-05	Lye Brook	Manchester	3.4	9/19/95	Poor
VT01-05	Lye Brook	Sunderland	7.0	7/17/95	Poor
VT01-05	Bourn Brook	Manchester	1.6	9/21/93	Excellent
VT01-05	Bourn Brook	Manchester	1.6	9/20/94	Excellent
VT01-05	Bourn Brook	Manchester	1.6	9/20/95	Excellent
VT01-05	Bourn Brook	Winhall	4.1	9/21/93	Good
VT01-05	Bourn Brook	Winhall	4.1	9/21/94	Good
VT01-05	Bourn Brook	Winhall	4.1	9/15/95	Excellent
VT01-05	West Branch Batten Kill	Manchester	3.4	10/6/93	Good
VT01-06	Warm Brook	Arlington	1.4	10/8/92	Good
VT01-06	Fayville Branch	Glastenbury	3.7	10/8/92	Good
VT01-06	Branch Pond Brook	Sunderland	0.1	9/19/94	Fair
VT01-06	Branch Pond Brook	Sunderland	0.1	9/20/95	Good
VT01-06	Branch Pond Brook	Sunderland	0.1	10/4/96	Fair

Appendix B

Population Data of Basin 1

Table B.1. Population of the Batten Kill watershed

Town	1970	1980	1990	2000	change 1970-1980	change 1980-1990	change 1990-2000
Arlington	1934	2184	2299	2397	13%	5%	4%
Sunderland	601	768	872	850	28%	13%	-3%
Manchester	2919	3261	3622	4180	12%	11%	15%
Sandgate	127	234	278	353	84%	19%	27%
Dorset	1293	1648	1918	2036	27%	16%	6%
Watershed	6874	8095	8989	9816	18%	11%	9%

Small portions of Shaftsbury, Glastenbury, Peru and Winhall are also in the watershed.

Table B.2. Population of the Walloomsac River watershed

Town	1970	1980	1990	2000	% change 1970-1980	% change 1980-1990	% change 1990-2000
Shaftsbury	2411	3001	3368	3767	24%	12%	12%
Glastenbury	0	3	7	16	-	-	-
Bennington	14586	15815	16451	15737	8%	4%	-4%
Woodford	286	314	331	414	10%	5%	25%
Pownal	2441	3269	3485	3560	34%	7%	2%
Watershed	19724	22402	23642	23494	14%	5%	-1%

Small portions of Stamford and Arlington are in this watershed.

Table B.3. Population of the Hoosic River watershed

Town	1970	1980	1990	2000	% change 1970-1980	% change 1980-1990	% change 1990-2000
Pownal	2441	3269	3485	3560	34%	66%	2%
Stamford	752	773	773	813	3%	0%	5%
Watershed	3193	4042	4258	4373	27%	5%	3%

A small portion of Bennington is in this watershed.

Appendix C

Dams of Basin 1

Table C.1. Dams in Basin 1

Dam Name and ID	Stream	Town	Status	Use*	Built	Re-con+
Miller Pond (5.01)	Warm Brook	Arlington	In Service	R	1937	
Red Mill (5.02)	Batten Kill	Arlington	Breached			
Ice Pond (5.06)	Warm Brook	Arlington	Unknown			
Lake Paran (17.01)	Paran Creek	Bennington	In Service	R	1851	1979
Whites Mill (17.02)	Paran Creek	Bennington	Unknown			
Stark Mill (17.03)	Paran Creek	Bennington	Unknown		1918	
Cushman (17.04)	Paran Creek	Bennington	Unknown			
Polygraphic (17.05)	Paran Creek	Bennington	Unknown			
Bennington Reservoir (17.06)	Barney Brook - OS	Bennington	Unknown			
Southern Vermont Orcha (17.07)	Jewitt Brook	Bennington	Unknown		1963	
Vermont Tissue (17.10)	Walloomsac River	Bennington	Unknown			
Vermont Veterans Home (17.16)	Roaring Branch - Trib	Bennington	Unknown	S	1890	1930
Beech Street (17.17)	South Stream - Trib	Bennington	Unknown			
South Village Pond (60.03)	Batten Kill - TR	Dorset	In Service	R	1890	1929
Marble Mill (60.06)	West Branch Batten Kill	Dorset	In Service	R	1875	1991
Dufresne Pond (121.01)	Batten Kill	Manchester	In Service	R	1908	1957
Equinox Pond (121.02)	Batten Kill - TR	Manchester	In Service	R	1890	

Dam Name	Stream	Town	Status	Use	Built	Re-con
Pickerel Pond (121.03)	Batten Kill - TR	Manchester	Unknown		1965	
South Stream Pond (159.02)	South Stream	Pownal	In Service	R	1958	
Barber Pond (159.03)	South Stream - TR	Pownal	In Service	R	1910	
Thompson Pond (Lower) (159.04)	South Stream - TR	Pownal	Unknown	R		1989
Thompson Pond (Upper) (159.05)	South Stream - TR	Pownal	In Service	R	1900	1989
North Pownal Reservoir (159.06)	Reservoir Hollow	Pownal	Unknown			
Pownal Tanning Co (159.07)	Hoosic River	Pownal	Not in Use	O	1907	1955
Lake Madeleine (181.01)	Hopper Brook	Sandgate	In Service	H	1957	
Barbos Lake (181.02)	Hopper Brook - TR	Sandgate	In Service	H	1957	
Hopper Pond (181.03)	Hopper Brook	Sandgate	In Service	H	1920	
Lake Madeleine Dike (181.04)	Green River - TR	Sandgate	In Service	H	1957	
Lake Shaftsbury (183.01)	Warm Brook - TR	Shaftsbury	In Service	R	1937	
Sucker Pond (195.01)	Sucker Pond Brook	Stamford	Unknown			
Bugbee Mill Pond (253.04)	City Stream	Woodford	Unknown	O	1936	
Big Pond (253.06)	City Stream	Woodford	Unknown			

* H = hydroelectric, R = recreation, C = flood control, S= water supply, O = other

+ reconstructed

Appendix D

Individual Waterbody Reports for

Basin 1 Rivers and Streams

North Branch - Hoosic River

Assessment Report

Waterbody No: VT01-01 **Assessment Year:** 2002

River Length (mi.): 24.6 **Date Last Updated:** 5/16/2002

Description: Headwaters in Vermont to the Massachusetts border and tributaries including Roaring, Brown, Goodrich, Harris and Fuller Brooks and Crazy John Stream

Location Identifiers

ANR Enforcement District: 8 **NRCS District:** 1

Fish and Wildlife District: 2 **Regional Planning Commission:** BEN

Assessment Information

Monitored (mi.): 0.0 **Assessment Types**

Evaluated (mi.): 0.0

Water Quality Limited? N

On 303(d) List? N

Monitored for Toxics? N

Aquatic Contamination **Toxics Testing**

None detected

Waste Management Zone - Miles: **Description:**

Assessment Comments

COMMENTS
North Branch Hoosic River:Trout were sampled at four locations on the North Branch of the Hoosic River. Station elevation 1090 near the Massachusetts border was sampled in 1995 and 1996. Station 1150 and 1350 upstream were also sampled in both years and station elevation 1530, the uppermost station, was sampled in just 1996. Temperature and conductivity were measured at 3 of the 4 stations at the time of the fish sampling in 1996. Conductivities were relatively low ranging from 60 to 102.

At station elevation 1090, 3 classes of brook trout were found in both 1995 (size classes 1,2,3) and 1996 (size classes 1,2,4) with more YOY found in 1996. At this station, 3 classes of brown trout were found in 1995 and then in 1996, brown trout were collected in the size classes 1,3,4, and 5. The population density of trout >= 6 inches was 293 in 1995 and 136 in 1996.

At station elevation 1150, there were brook trout collected in size classes 1 and 2 in 1995 and 1,2 and 3 in 1996. Brown trout were found in size classes 1 and 3 in 1995 and size classes 1 and 5 in 1996. The numbers of trout were low. The YOY numbers were up for brown trout in 1996 with a population estimate of 397 YOY brown trout/mile.

At station elevation 1350 in 1995, there were 3 classes of brook trout represented in the sample with a good

North Branch - Hoosic River **VT01-01**

number of YOY trout (1382 per mile). In 1996, there were 2 class sizes of brook trout represented. At this station, brown trout were present in the first three size classes in the 1995 sample. In 1996, there were some YOY brown trout sampled and a few trout in size class 3.

Station elevation 1530 was only sampled in 1996 and only brook trout, no brown trout, were found.

Roaring Branch of the North Branch Hoosic River: One stretch at station elevation 1210 was sampled for trout in October 1995. Three classes of brook trout were found and two classes of brown trout (size classes 1 and 3). The population density of trout >= 6 inches was 189 trout/mile.

In 1988, Jerry Jenkins, Botanist and Environmental Consultant stated that the North Branch is a highly erodable stream mostly due to natural streambank erosion, although some development has occurred in the watershed.

INFORMATION SOURCES

Chet MacKenzie, Vermont Department of Fish & Wildlife - data and information from trout population surveys

Use No.	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	0.0	0.0	0.0	0.0	24.6
20	Aquatic biota/habitat	0.0	0.0	0.0	0.0	24.6
21	Fish consumption	0.0	24.6	0.0	0.0	0.0
42	Contact recreation	0.0	0.0	0.0	0.0	24.6
44	Noncontact recreation	0.0	0.0	0.0	0.0	24.6
50	Drinking water supply	0.0	0.0	0.0	0.0	24.6
62	Aesthetics	0.0	0.0	0.0	0.0	24.6
72	Agriculture water supply	0.0	0.0	0.0	0.0	24.6

Permit No.	Point or Nonpoint Source Description	Receiving Water
9-0030	Andover Hills Dev - indirect & SW(1)	North Branch & Fuller Brook

Hoosic River

Assessment Report

Waterbody No: VT01-02 **Assessment Year:** 2002

River Length (mi.): 7 **Date Last Updated:** 7/23/2002

Description: Hoosic River mainstrem from the Massachusetts border downstream through Vermont to the New York border

Location Identifiers

ANR Enforcement District: 8 **NRCS District:** 1

Fish and Wildlife District: 2 **Regional Planning Commission:** BEN

Assessment Information

Monitored (mi.): 7.0

Evaluated (mi.): 0.0

Water Quality Limited Y

On 303(d) List? Y

Monitored for Toxics? Y

Assessment Type

Land use information and location of sources

Occurrence of conditions judged to cause impairment

Fish tissue analysis

RBP III or equivalent benthos surveys

Aquatic Contamination

Fish tissue contamination above FDA or NAS leve

Sediment contamination

Toxics Testing

Metals in sediments

Waste Management Zone - Miles 1.00 **Description** down from Mack Pownal Realty Corp outfall

Assessment Comments

NON-SUPPORT MILES

Hoosic River: 7.0 - entire length in Vermont (same stretch as below) - non-support of fish consumption due to PCBs in fish tissue. c(300) s(6600,8500)

PARTIAL SUPPORT MILES

Hoosic River: 7.0 - entire length in Vermont - partial support of secondary contact recreation (fishing), contact recreation, aquatic biota/habitat, aesthetics; threats to drinking water supply and agricultural water supply due to metals, toxic compounds, pathogens and nutrient enrichment from industrial sources, hazardous waste sites, straight pipes from houses and failed septic systems. c(300,500,900,1700,1900) s(200,6300,6500,6600,8200)

COMMENTS

A wastewater facilities planning report done for the Town of Pownal in 2000, updated March 2002, documents the direct sewage discharges and failed septic systems that are polluting the Hoosic River. Three pipes from 17 homes discharge raw sewage to the Hoosic; surfacing effluent from over 80 mobile homes makes its way through drainage ditches and a stream to the Hoosic; and surfacing effluent from 2 other homes and an apartment building also go to a stream then the Hoosic.

Hoosic River **VT01-02**

Macroinvertebrate sampling was done on the Hoosic River in Pownal at milepoint 37.2 in October 2000 and the community assessment was good. Sampling was done at milepoint 37.2 and 42.0 in September 1998 and the community assessments at those sites that year was fair. In 1991, the Hoosic River macroinvertebrate community was in fair condition (meaning that there was only partial support of the macroinvertebrate community's health and integrity).

A 1.1 mile stretch of the Hoosic River upstream of the dam in North Pownal was canoed in August 1999. Vermont DEC Water Quality Division staff made observations on instream water conditions, streambank condition, adjacent land uses and vegetation types and sources of pollution. The water at the time was slightly turbid and in the upstream portion of the stretch evaluated, there was "floating organic matter topped with bright green algae." The algae was in floating clumps up to 4-6 cm across on the water and collected on the sandy gravel bars. About 50-75 feet from the river in the woods was a large junkpile. All along the stretch, the river bottom was covered with junk: tires, pieces of metal, cans, bottles. (2000)

Nitrogen and phosphorus sampling was done in July and August 1999 at two sites on the Hoosic River in Vermont. Both sites were sampled on July 6 (low flow), July 7 (the day after a rain event) and August 5 (low flow). The total phosphorus results at the site just upstream of the Main Street bridge in Pownal were 30 ug/liter, 46 ug/ liter and 30 ug/liter on the above 3 dates. The results downstream were taken just above the Route 346 bridge near the New York border and were 33 ug/liter, 54 ug/liter and 20 ug/liter.

Data and information is summarized in the Massachusetts Department of Environmental Protection 1997 Water Quality Assessment Report for the Hudson River Basin on the segment of the Hoosic River that is just upstream of the Vermont state line (Segment MA 11-05). Sediment sampling that was done in September 1999 by EPA found sediment PCBs exceeded the L-EL guideline at the sites described. Copper, lead, nickel and zinc were all elevated and "above their respective L-EL Provincial Sediment Quality Guidelines (Persaud et al. 1993)" at one site and copper exceeded the L-EL at the second site. The Massachusetts Department of Public Health as of 1994 has had a "no consumption" advisory on fish in the Hoosic River from the channelized section of the river in North Adams downstream to the stateline.

Dead fish and crayfish were observed immediately below the old tannery dam in North Pownal in August 1998.

New York DEC sampled a site in 1993 and 1994 in Petersburg, NY, which is 3 miles downstream of the NY/Vermont border. The site was sampled as part of their Rotational Intensive Basin Study (RIBS) assessment work. They found: a slightly impacted macroinvertebrate community; PCBs in caddisflies above the "provisional level of concern"; a crayfish sample with PCBs and organochlorine pesticides above the minimum reporting levels; iron and lead at levels of concern in the water column. Overall they have rated the water quality of the Hoosic River as poor in Petersburg.

There is a fish consumption advisory for brown trout on the Hoosic River in Massachusetts, which also applies to the entire 7.0 miles in Vermont. The advisory started in April 1989 and is due to PCB contamination. There is also a fish consumption advisory for brown and rainbow trout in New York.

There has been much investigation, assessment, monitoring and other activity and hundreds of millions of dollars spent on the Pownal Tannery site along the Hoosic River. The former tannery building has been decontaminated and taken down. The landfill that received sludge from the lagoons has been graded and capped. About 2500 cubic yards of contaminated fill has been removed from the Woods Road Disposal Area and the area has been graded. Rip-rap was put in place along the edge of the Hoosic River where the disposal area meets it. At the lagoon area, the clarifier and press buildings were removed. Sludge with metals (arsenic, lead, other) and other toxics remain in lagoon 1 and 5. Lagoons 2, 3a, 3b and 4 have been cleaned out. The lagoon area is the site of the proposed WWTF for Pownal. Sediment testing in the vicinity of the tannery site (about 2.5 miles upstream, adjacent to, and downstream) found PCB concentrations from non-detect to 0.041 mg/kg. The site specific human health risk exposure level calculated for the site by EPA assuming an intensive recreational use by all ages was 0.000021 mg/kg. The Ontario Ministry of Environment default sediment concentrations for risk to aquatic organisms is 0.00001 mg/kg.

General Cable: Seep largely under control but treatment ongoing - the containment system is in place but it is not 100% effective. May still see impacts at high water.

INFORMATION SOURCES

Town of Pownal, Vermont, Wastewater Facilities Planning Preliminary Engineering Report, August 2000. Update March 2002 - lists and briefly describes the direct pipes and failing septic systems in North

Hoosic River **VT01-02**

Pownal, Pownal, and Pownal Center.

Chet MacKenzie, Vermont Department of Fish & Wildlife, Pittsford Office - data from fish population surveys in the Hoosic River watershed (2002)

Hoosic River Stream Walk Report, 1999. Dan Farrell and Heather Nicholson, Vermont DEC Water Quality Division.

Steve Fiske, Vermont DEC Water Quality Division, Biomonitoring and Aquatic Studies Section - provided data and analysis of Vermont macroinvertebrate sites

Shayne Jacquith, Vermont DEC Water Quality Division - field observation of dead fish and crayfish in August 1998.

Hudson River Basin 1997 Water Quality Assessment Report, Massachusetts Department of Environmental Protection.

Upper Hudson River Drainage RIBS 1993-1994, June 1996, New York Department of Environmental Conservation.

Use No	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	0.0	0.0	7.0	0.0	0.0
20	Aquatic biota/habitat	0.0	0.0	7.0	0.0	0.0
21	Fish consumption	0.0	0.0	0.0	7.0	0.0
42	Contact recreation	0.0	0.0	7.0	0.0	0.0
44	Noncontact recreation	0.0	0.0	7.0	0.0	0.0
50	Drinking water supply	0.0	7.0	0.0	0.0	0.0
62	Aesthetics	0.0	0.0	7.0	0.0	0.0
72	Agriculture water supply	0.0	7.0	0.0	0.0	0.0

Impairment Cause	Magnitude	Size (mi.)
Priority organics	H	7.00
Metals	M	7.00
Nutrients	M	7.00
Pathogens	M	7.00

Impairment Sourc	Magnitude	Size (mi.)
Onsite wastewater systems (septic tanks)	M	7.00
Hazardous waste	H	7.00
In-place contaminants	M	7.00

Permit No.	Point or Nonpoint Source Description	Receiving Water
VT0000639	Mack Pownal Realty Corp. - WW .003mgd	Hoosic River
1-0816	Laurie Waisel - SW(1)	Hoosic River
	Pownal Tannery	Hoosic River

Walloomsac River

Assessment Report

Waterbody No: VT01-03 **Assessment Year:** 2002

River Length (mi.): 104.7 **Date Last Updated:** 7/23/2002

Description: Mouth to headwaters and tributaries including Paran Creek, Furnace Brook, Roaring Branch, Barney Brook, South Stream, Hewitt Brook and Jewett Brook

Location Identifiers

ANR Enforcement District: 8 **NRCS District:** 1

Fish and Wildlife District: 2 **Regional Planning Commission:** BEN

Assessment Information

Monitored (mi.): 9.5

Evaluated (mi.): 95.2

Water Quality Limited? Y

On 303(d) List? N

Monitored for Toxics? Y

Aquatic Contamination

Assessment Types

Surveys of fish and game biologists or other professionals

Land use information and location of sources

Non-fixed station chemical/physical monitoring-conventional and tox

Biological Monitoring

Toxics Testing

Organics in water column

Organics in sediment

Pesticides in sediments

Metals in sediments

Waste Management Zone - Miles: 3.00 **Description:** below Bennington WWTF outfall

Assessment Comments

NON-SUPPORT MILES

Hewitt Brook: 0.2 - downstream of Bennington landfill - nonsupport of aquatic biota/habitat, contact recreation, secondary contact recreation, and drinking and agricultural water supplies due to metals and PCBs in surface water and sediment. (0.2 miles is an arbitrary distance until DEC knows more) c(300,500) s(6300)

PARTIAL SUPPORT MILES

Jewett Brook: 1.0 - downstream of Pownal Center - partial support of contact recreation and aesthetics (threats to aquatic habitat) due to pathogens and nutrients from untreated wastewater from failed septic systems or overflow areas. c(900,1700) s(6500)

Roaring Branch: 1.8 - partial support of aquatic habitat and secondary contact recreation due to channel instability and ongoing degradation and widening in response to channel management activities after floods. c(1600) s(7550,7700)

THREATENED MILES

Walloomsac River: 8.0 - through Bennington Village - threats to aquatic biota/habitat, contact recreation, and aesthetics due to increased peak flows, nutrients, turbidity, and sedimentation from urban stormwater runoff, road maintenance. c(1100,1600,2500) s(4000,4500)

Walloomsac River **VT01-03**

Barney Brook: 0.2 - threats to aquatic biota/habitat, swimming, secondary contact recreation, drinking and agricultural water supplies due to leachate entering brook from Burgess Landfill and Burgess Superfund Site. c(400,500) s(6600)

Cold Spring Brook: 1.0 - threats to aquatic biota/habitat and aesthetics due to sedimentation and turbidity from ag runoff and bank erosion. c(1100) s(1000,7600,7700)

Bolles Brook: 5.0 and Bickford Brook: 4.0 - both have threats to aquatic biota/habitat and secondary contact recreation (fishing) because they are two of the most sensitive streams to acid precipitation (low buffering capacity, high pH, low alkalinity). c(1000) s(8100)

Bolles Brook: 0.2 - below Bennington Water Dept. supply withdrawal (likely is a subset of the 5.0 miles above - the 0.2 and T status are arbitrarily assigned until more information is gathered) - threats to aquatic biota/habitat, aesthetics, contact recreation, and secondary contact recreation due to low or no flow from water supply withdrawal. c(1500) s(7430)

Basin Brook: 0.2 - below North Bennington water supply outtake - threats to aquatic biota/habitat, aesthetics, contact recreation,and secondary contact recreation due to low or no flow from water supply withdrawals. c(1500) s(7430)

COMMENTS

Vermont DEC macroinvertebrate sampling on the Walloomsac River at milepoint 9.2 has found the community in "good" health in 1988, 1989, 1992, 1994, and most recently 1998 (from 1983 to 1985 there were "poor" results). The "good" assessment is borderline at least in 1998 - the data indicate moderate enrichment at the site with the EPT value a little low. The Walloomsac was also sampled at milepoint 15.4 in 1998 and the macroinvertebrate community assessment was "good".

New York State did kick net sampling on the Walloomsac River just below the Vermont/New York border at the Cottrell Road bridge. Both the 1993 and 1994 kick samples showed aquatic biota to be "slightly impacted, although most indices bordered on nonimpacted." Silt appeared to be the primary cause of the slightly altered macroinvertebrate community. "Analysis of a bottom sediment sample collected in 1994 showed no metals, PCBs or pesticides to be parameters of concern. Polynuclear aromatic hydrocarbons (PAHs) were found in the sediment in low but measurable quantities. (1996)

Vermont DEC macroinvertebrate sampling on Bickford Hollow Brook at rivermile 0.4 in 1995 and 1996 found the community health and integrity to be "good." The Roaring Branch was sampled at rivermile 0.1 in 1998 and was also found to be "good."

Vermont DEC Water Quality Division River Management Program did a physical assessment of the Roaring Branch as part of review of the Proposed Roaring Branch Village Development and reported on their findings March 15, 2001. Their conclusions were that "channel management practices associated with historic flood protection projects on the Roaring Branch have significantly affected flood patterns and triggered a profound physical response of the stream system.. The physical process being observed and the resulting unstable channel condition is consistent with and a consequence of past floodway encroachments and channel management practices." Their channel surveys, substrate sampling, and shear stress analysis show "an extreme imbalance of stream power and resistance of bed and bank materials to mobilization by flood flows. This is primarily due to the entrenched condition of the Roaring Branch channel."

The status of Barney Brook was changed from partial support of uses to threatened because data from monitoring at both the Burgess CD&D Landfill and the Burgess Superfund Site showed only occasional elevated (but not above standards) levels of organics and metals in surface water samples. Sampling done earlier in spring 1989 below Burgess Landfill had found organics and metals in the water column exceeding standards. (1998)

Eveready Battery (South Stream) is a hazardous waste site that contains metaling wastes and acids. In 1990, the Ld, Ni and trichlorethene in monitoring wells was gone or nearly stabilized. In November 1997, the site was closed - "site management activity complete", which means that the groundwater enforcement standards are met on the entire property and "any residual contamination does not pose an unacceptable risk to human health or the environment."

Eagle Square Industries (Paran Creek) - monitoring wells installed - lead in groundwater. No surface water contamination.

Johnson Controls (Furnace Brook) - formerly there was hazardous waste 3000' from the brook at the Johnson Controls site. Lead-oxide dust known to be discharged twice, sediments in drainage ditch found to have chlorobenzene, ethylene, Cr, Se, Pb - 20x background levels. Soil with the lead and other contaminants was removed and disposed out-of-state. The site is closed and the Vermont DEC WMD

Walloomsac River **VT01-03**

Hazardous Waste Section requires nothing further. (2002)

Bennington Landfill (Hewitt Brook) - October 1999 surface water and sediment samples along Hewitt Brook and Pond B at the old Bennington landfill site were analyzed for metals and PCBs. Ten surface water samples and twenty sediment samples were taken. In the surface water samples, "concentrations of eight metals (aluminum, barium calcium, copper, iron, manganese, silver and sodium) were detected above the chronic benchmark values. Barium was detected above both chronic and acute benchmarks in all of the samples analyzed." Also in the surface water samples, "concentrations of total PCBs exceeded the chronic Ambient Water Quality Criteria (WQC) at all 10 of the sampling locations." "All of the metals except antimony were detected above method detection limits in one or more of the sediment samples. Five of the metals (arsenic, copper, iron, manganese and nickel) were detected at concentrations above the Lowest Effects Level (LEL). Arsenic was detected in all but five of the samples at concentrations exceeding the LEL with samples collected at 3 sample locations exceeding the Severe Effects Level (SEL). Analyses of all but six of the sediment samples showed total PCB concentrations above LEL values.

The chlorine discharges that had occurred to Morgan Brook in 1988, 1989 and then again early 1998 will no longer occur. Following the 1998 discharge, a 4 inch pipe that discharged from an old municipal building into a spring and then into Morgan Brook was discovered. This pipe was what had allowed the chlorine discharges and resulting fish kills. The pipe is being removed so the problem will no longer occur. Impacts to Morgan Brook removed. (1998)

In the following summaries of fish population survey data, the size classes discussed are as follows: class 1 - young-of-year fish, class 2 - greater than young-of-year but less than or equal to 6 inches; class 3 - greater than 6 inches but less than or equal to 10 inches; class 4 - greater than 10 inches but less than or equal to 12 inches; and class 5 - greater than 12 inches. If a number of classes is given the assumption is the number starting with class 1 or YOY and going up unless otherwise clarified.

The Walloomsac River itself was sampled for trout at 7 stations in the 1990s: it was sampled at station elevation 510 in 1995; at station elevation 550 in 1995; at station elevation 570 in 1995; at station elevation 575 in 1996; at station elevation 605 in 1992 and 1995; at station elevation 675 in 1998; and at station elevation 715 in 1992, 1993, 1995 and 1998. Several stations were also sampled in 1982. Brown trout were present in 3,4, or 5 size classes at each sampling station in the years sampled. Brook trout were mostly absent although they were at few sites in a few years and low in number. Rainbow trout were also found during some of the sampling - small numbers found at different sites in different years. In 1995, the population density of trout >= 6 inches was 95 trout/mile at station 510; 505 trout/mile at station 550; 48 trout/mile at station 570; 647 trout/mile at station 605; and 430 trout/mile at station 715. In 1998, the population density of trout >= 6 inches was 553 trout/mile at station 675 and 577 trout/mile at station 715.

City Stream: The wild trout populations of City Stream were sampled at two stations in September 1997. Young-of-year brook trout as well as the next two size classes were in the stream in moderate numbers at both stations. Young-of-year brown trout were present at the lower station, some browns less than 6 inches were present at the upper station, and some brown trout fish in the size class 3 were found at both sites. At station elevation 1260, 190 trout per mile greater than or equal to 6 inches were estimated. At station elevation 1420, 226 trout per mile greater than or equal to 6 inches were estimated.

Stamford Stream: Trout surveys were done at three sampling locations on Stamford Stream in 1997. At station elevation 1480, both brook trout and brown trout were present in the first 3 size classes with 216 trout per mile greater than or equal to 6 inches. The brown trout were somewhat low in number but the brook trout numbers were fair. At station 1820, brook trout were represented in the first three size classes while the brown trout population was low (class sizes 1 and 3 represented only). Overall there were 268 trout per mile greater than or equal to 6 inches. At station elevation 2120 only a few class 2 and 3 brook trout were present.

Roaring Branch Walloomsac Brook: Trout sampling was done on one stretch of Roaring Branch between Bennington village and Woodford at elevation 1020 in 1996. A fair number of brook trout in 3 size classes were found and a few brown trout in each of size classes 2,3, and 4 were found. The population density estimated was 301 trout/mile (>= 6 inches).

Cold Spring Brook: The wild trout populations of Cold Spring Brook were sampled at the three stations in August 1998. There were good numbers of brook trout and brown trout at the two lower stations with brook

trout found in the first three size classes and brown trout found in the first four size classes. At station elevation 545, the estimated trout population was 505 trout/mile (>= 6 inches) and at station elevation 610, the trout population was about 322 trout/mile (>= 6 inches). At the uppermost station (elevation 710), a good number of brook trout were found in the first three size classes, but the brown trout population at this site was low. The estimated trout population was 63 trout/mile (>= 6 inches).

Furnace Brook:Fish population sampling was done on Furnace Brook at 3 stations in 1971, at 2 stations in 1993, at 3 stations in 1998, and at 4 stations in 1999. In 1993 at station elevation 640 and 740 at the lower end of Furnace Brook, there were fair numbers of brook trout with the first three size classes represented and moderate numbers of brown trout with four size classes and three size classes represented respectively). YOY brown trout were estimated at 946 trout/mile at station 640 and 995 trout/mile at station 740. At station 640, the population density for trout >= 6 inches was 268 trout/mile. At station 740, the population density for trout >= 6 inches was only 72 trout/mile. In 1998, at station elevations 1070, 1125, and 1260, there were very good numbers of trout sampled. Four class sizes of both brook and brown trout were represented at station 1070 and there were an estimated 627 trout per mile >= 6 inches. Four class sizes of brook trout and two class sizes of brown trout were found at station elevation 1125. The population density at this site was 196 trout/mile >= 6 inches. Three class sizes of brook trout were found upstream at station elevation 1260 where there is an estimated population of over 1500 trout/mile with 219 trout/mile >= 6 inches. The 1999 sampling results at station elevations 890, 1070, 1125, and 1255 were similar to that of 1998 with good numbers of brook trout in the first three size classes at all four stations and brown trout in four size classes at elevation 890, three size classes at elevation 1070, two size classes at elevation 1125 and not found at the upstream location at elevation of 1255. The population density at elevation 890 was 378 trout/mile >= 6 inches; at elevation 1070 was 305 trout/mile >= 6 inches; at elevation 1125 was 272 trout/mile >= 6 inches; and at elevation 1255 was only 40 trout/mile >= 6 inches.

Jewett Brook: The latest fish population sampling on Jewett Brook was in 1993 when two stations were sampled. At station elevation 720, brown trout in class size 2 were the only trout found in the sample stretch. At station elevation 740, brown trout in class size 3 were found when sampling. At station elevation 740, brook trout in size classes 2 and 3 were found. The population density at elevation 340 was 312 trout/mile >= 6 inches. Jewett Brook meanders through many wetland communities in its journey from Pownal Center to its confluence with South Stream and is not a prime trout fishery stream.

South Stream: Fish populations were sampled at three stations in 1971 but only one station was sampled in 1993 and there were no more recent samples. There were few brook trout and relatively few rainbow trout in the sample. The population of brown trout, however, was good with 1231 trout/mile >= 6 inches estimated from the sampling results.

Paran Creek: Trout sampling was done on two stretches of Paran Creek in the 1990s. In 1993, the stream was sampled at station elevation 700 and both brook and brown trout were found. Brown trout were represented in four size classes and brook trout in two with no YOY collected in that sampling run. The population density in 1993 at this site was about 328 trout/mile >= 6 inches.
In 1999, the stream was sampled at station elevation 660 and again at station elevation 700. Good numbers of brown trout were found that year with a small number of brook and rainbow trout. At station elevation 660, the population density was 208 trout/mile >= 6 inches. At station elevation 700 in 1999, the population density was about 368 trout/mile >= 6 inches.

Bennington WWTF sampled for priority pollutants 8/88. Possible silver contamination at chronic levels in Walloomsac River. All other metals and organics ok.

There is one CSO remaining after the sewer separation work in Bennington but it is an inactive one. It has been monitored for several years to confirm its status. (1998)

A number of sources of untreated wastewater to Jewett Brook have been identified in the Town of Pownal Wastewater Facilities Planning Report. The problem situation include Royal Pine Villa Mobile Home Park with a washed out leachfield and cracked piping, the Cozy Meadows Mobile Home Park with a leachfield overflow pipe, Pownal Elementary School where seepage from an overflow mound gets to the brook and a home where an overflow pipe goes to a wetland that flows to the brook.

In past assessments, there were reports that Dailey's Ready Mix Plant settling lagoons would overflow and create turbid conditions and sedimentation from South Shaftsbury to the mouth. There have been no

Walloomsac River **VT01-03**

new reports or complaints for many years and it appears that the situation is remedied. Neither the EEO or the Stream Alteration Engineer knew of any problems there.

INFORMATION SOURCES

Town of Pownal, Vermont Wastewater Facilities Planning Preliminary Engineering Report, August 2000, Updated March 2002, Forcier Aldrich & Associates for the town of Pownal.

Chuck Schwer, Vermont DEC WMD Hazardous Waste - status of Johnson Controls site in Bennington (2002)

Chet MacKenzie, Vermont Department of Fish & Wildlife, Pittsford Office - data from fish population surveys done in Hoosic and Walloomsac Rivers watersheds (2002)

Vermont ANR DEC Water Quality Division River Management Program, March 2001. Physical Assessment of the Roaring Branch Relating to the Proposed Roaring Branch Village Development, Bennington, Vermont Executive Summary. (2002)

Bruce Linton, Vermont DEC Waste Management Division - information on the closed status of the Eveready Battery site (77-098) and copy of the SMAC letter to Eveready dated November 3, 1997 from the WMD. (2000)

Data Evaluation Report October 1999 Surface Water & Sediment Sampling Event, Multi-Site Post-Construction Monitoring Bennington Landfill Superfund Site, Bennington, Vermont, March 2000. TRC Environmental Corporation for EPA. (2000)

Steve Fiske, Vt. DEC Water Quality Division Biomonitoring and Aquatic Studies Section - biomonitoring data on the Walloomsac

Don Gallus, ANR Environmental Enforcement Division - noted the discovery and planned removal of the 4 inch line that had allowed the chlorine discharges to Morgan Brook. (1998)

Spring 1996 Long Term Monitoring Plan Report: Burgess Brothers Superfund Site, Bennington and Woodford, Vermont. August 20, 1996. ERM-New England, Boston, Mass. (provided by Linda Provencher, DEC Hazardous Waste (1998)

Jim Surwilo, Vt DEC Solid Waste Section - provided Burgess Landfill surface water monitoring results from 1997 - organics and inorganics (1998)

1993-1994 Upper Hudson River Drainage RIBS Report, June 1996 - information about the 1993 and 1994 sampling results in the Walloomsac River just below the Vermont/New York border.

Use No.	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	82.1	19.6	2.8	0.2	0.0
20	Aquatic biota/habitat	83.1	19.6	1.8	0.2	0.0
21	Fish consumption	0.0	104.7	0.0	0.0	0.0
42	Contact recreation	94.9	8.6	1.0	0.2	0.0
44	Noncontact recreation	93.1	9.6	1.8	0.2	0.0
50	Drinking water supply	104.3	0.2	0.0	0.2	0.0
62	Aesthetics	94.3	9.4	1.0	0.0	0.0
72	Agriculture water supply	104.3	0.2	0.0	0.2	0.0

Impairment Cause	Magnitude	Size (mi.)
Priority organics	H	0.20
Metals	H	0.20
Metals	T	0.20
Nutrients	T	8.00
pH	T	9.00
Siltation	T	9.00
Flow alterations	T	0.40
Other habitat alterations	T	8.00
Turbidity	T	8.00
Nutrients	M	1.00
Pathogens	H	1.00
Other habitat alterations	H	1.80

Walloomsac River **VT01-03**

Impairment Source	Magnitude	Size (mi.)
Urban/developed land runoff	T	8.00
Highway/road/bridge runoff	T	8.00
Flow mod.- water supply water withdrawal	T	0.40
Streambank modification/destabilization	T	1.00
Atmospheric deposition	T	9.00
Landfills	H	0.20
Onsite wastewater systems (septic tanks)	H	1.00
Channel instability	M	1.80
Streambank modification/destabilization	M	1.80

Permit No.	Point or Nonpoint Source Description	Receiving Water
VT0000361	Eveready Battery - cooling water (CW)	Morgan Brook & Walloomsac Rive
VT0100021	Bennington WWTF 5.1mgd & 1 CSO	Walloomsac River
VT0020958	Vermont Dept Fish &Wildlife Hatchery	South Stream
VT0000612	Stanley Tools - CW	Paran Creek
	Eagle Square Industries lagoons	Paran Creek
	Burgess CD&D Landfill & Superfund site	Barney Brook
	Bennington Landfill	Hewitt Brook
1-0922	John Hogan - stormwater (SW) (1)	Walloomsac River
1-1028	Bennington Acres - SW	Walloomsac River
1-1137	Catamount Mobile Home Park - SW (2)	Roaring Branch
1-1513	Bourn Brook Properties LLC	Bourn Brook
1-0842	Robert Church - SW (2)	South Stream & Roaring Branch
1-0858	Bennington County Ind Corp - SW (3)	Furnace Brook
1-0806	Royal Street Subdivision - SW (2)	Paran Creek & Walloomsac River
1-0774	Barber Pond Subdivision - SW (3)	Barber Pond & Trib
1-0793	Colgate Manor Corp - SW (1)	Trib Walloomsac River
1-1017	George Corey - SW (1)	Trib Jewett Brook
1-1073	Keith Jelley - SW (3)	Furnace Brook
1-1274	Town of Bennington - SW (1)	Walloomsac River
1-1357	Vermont Agency of Transportation - SW(9)	Walloomsac R, Furnace & Airport
9-0135	Pownal Elementary School - indirect	Jewett Brook
9-0165	Shaftsbury Elementary School - indirect	Paran Creek
1-1389	BLS Bennington LLC - SW (1)	Walloomsac River
1-1397	Putnam Memorial Health Corp - SW (1)	Walloomsac River

Batten Kill Main Stem
Assessment Report

Waterbody No: VT01-04 **Assessment Year:** 2002

River Length (mi.): 20 **Date Last Updated:** 7/5/2002

Description: N.Y. Border to Confluence of West Branch

Location Identifiers

ANR Enforcement District: 8 **NRCS District:** 1

Fish and Wildlife District: 1 **Regional Planning Commission:** BEN

Assessment Information

Monitored (mi.): 20.0

Evaluated (mi.): 0.0

Water Quality Limited?

On 303(d) List? N

Monitored for Toxics? Y

Aquatic Contamination

None detected

Assessment Types

Land use information and location of sources

Fixed station chemical/physical monitoring-conventional pollutants

RBP III or equivalent benthos surveys

Fish surveys

Visual observation, may quantify some parameters, single season,

Toxics Testing

Waste Management Zone - Miles: 1.50 **Description:** downstream from Manchester WWTF outfall

Assessment Comments

THREATENED MILES
Battenkill: 20.0 - threats to aquatic biota/habitat, aesthetics, and secondary contact recreation due to sedimentation, nutrients, temperature, garbage, and habitat alteration from urban stormwater runoff and high impervious cover (Manchester area), golf courses, loss of riparian vegetation, streambank erosion and some agricultural activity. c(1100,1400,1600) s(1000,3100,4000,7600,7700,8710)

COMMENTS
The Batten Kill had been considered one of the best trout fishing rivers in Vermont and a high quality water. The Batten Kill was designated an Outstanding Resource Water (ORW) on June 12, 1991 by the Vermont Water Resources Board due to its exceptional cold water fishery, fisheries habitat, wildlife habitat and other natural, recreational, cultural and scenic values. Over the past 10 years or so, however, the self-sustaining, wild brown trout population has declined significantly and no conclusion has yet been made about the causes. Fish population, temperature, physical and chemical data are being collected at a number of sites on the Batten Kill and some tributaries to try to determine factors that may have contributed to the fishery decline.

The Manchester area is heavily developed and development and paving continues. Although the population increased 11% between 1980 and 1990, the number of housing units increased 39%. From 1990 to 2000, population increased 15% and housing units increased 8%. Numbers on the increase in

Batten Kill Main Stem **VT01-04**

commercial developments and impervious surface would be valuable and don't exist as of this waterbody report date. There are at least 19 permitted stormwater discharges for the Batten Kill itself and 31 permitted stormwater discharges to its tributaries in addition to direct and indirect discharges. Through and below Manchester, garbage gets into the Batten Kill - shopping carts, plastic bottles, lumber, misc over-the-bank debris.

The Sunderland landfill is closed and capped now and surface and groundwater monitoring is done twice a year at the site. The latest sampling was done in May 2001 and there were no inorganics or organics found in the samples collected at any of the three surface water sites (adjacent, upstream, downstream). The surface water sampling has indicated essentially no problems over the years of sampling. At the groundwater monitoring well 103, there were exceedances of the groundwater standard for several organic compounds but the values declined over the years and have been below standards for the last one to three years (depending on the constituent). (2001)

The Wessner landfill was closed and capped about 20 years ago - early 1980s. It is located adjacent to the Sunderland landfill.

Macroinvertebrate sampling at milepoint 34.9 and 48.2 in October 1998 on the Batten Kill found the community integrity to be excellent. Sampling at these same two stations in 2001 found the community integrity to be "very good" at each site. At rivermile 47.0 in 2001, the community assessment was "good". (2002)

INFORMATION SOURCES

Ken Cox, Vermont Dept of Fish & Wildlife - information on the fishery and threats on the Batten Kill
Vermont DEC Water Quality Division biological monitoring data and interpretation
Vermont DEC Waste Management Division Hazardous Waste Section files - data from Sunderland landfill monitoring

Use No.	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	0.0	20.0	0.0	0.0	0.0
20	Aquatic biota/habitat	0.0	20.0	0.0	0.0	0.0
21	Fish consumption	0.0	20.0	0.0	0.0	0.0
42	Contact recreation	20.0	0.0	0.0	0.0	0.0
44	Noncontact recreation	0.0	20.0	0.0	0.0	0.0
50	Drinking water supply	0.0	0.0	0.0	0.0	20.0
62	Aesthetics	0.0	20.0	0.0	0.0	0.0
72	Agriculture water supply	0.0	0.0	0.0	0.0	20.0

Impairment Cause	Magnitude	Size (mi.)
Siltation	T	20.00
Other habitat alterations	T	20.00
Thermal modifications	T	20.00

Impairment Source	Magnitude	Size (mi.)
Agriculture	T	11.00
Urban/developed land runoff	T	6.50
Streambank modification/destabilization	T	20.00
Golf courses	T	4.00
Removal of riparian vegetation	T	20.00

Permit No.	Point or Nonpoint Source Description	Receiving Water
VT0100170	Manchester WWTF 0.6 mgd & 1 CSO	Batten Kill
1-0507	Green Mountain Group - SW (5)	Batten Kill
1-0529	Staykris Corporation - SW (1)	Batten Kill

Batten Kill Main Stem **VT01-04**

1-0588	Mark Shulman - SW (2)	Batten Kill
1-0670	Eagle Development Corp - SW (2)	Batten Kill
1-0692	Robert Dowling - SW (1)	Batten Kill
1-0758	Batten Kill Industrial Park - SW (2)	Batten Kill
1-0832	Hill's Court - Sw (1)	Batten Kill
1-0849	Snowfall Inc - SW (3)	Batten Kill
1-0967	Vanderbilt Dev Corp - SW (1)	Batten Kill
1-1218	Ronald Carpenter - SW (1)	Batten Kill wetland

Main Stem Tribs - Batten Kill

Assessment Report

Waterbody No: VT01-05 **Assessment Year:** 2002

River Length (mi.): 55.5 **Date Last Updated:** 7/1/2002

Description: Batten Kill above West Branch confluence (East Branch of Batten Kill to some) and tributaries including the West Branch, Bourn Brook, Tanner Brook, Green River

Location Identifiers

ANR Enforcement District: 8 **NRCS District:** 1

Fish and Wildlife District: 1 **Regional Planning Commission:** BEN

Assessment Information

Monitored (mi.): 13.5

Evaluated (mi.): 42.0

Assessment Types

Land use information and location of sources

RBP III or equivalent benthos surveys

Water Quality Limited?

On 303(d) List? Y

Monitored for Toxics? Y

Aquatic Contamination

None detected

Toxics Testing

Waste Management Zone - Miles: **Description:**

Assessment Comments

NON-SUPPORT MILES

Lye Brook: 4.5 - from headwaters to 2.5 miles above mouth - non-support of aquatic biota due to critically acidified water from atmospheric depostion. c(1000) s(8100)

THREATENED MILES

Batten Kill mainstem: 6.2 - from East Dorset down to confluence of West Branch - threats to secondary contact recreation from unknown sources at this point and: 0.9 - through Manchester - threats to aesthetics and aquatic biota/habitat due to garbage in river, loss of riparian vegetation, stormwater runoff s(4000,7600)

West Branch: 0.6 - through Manchester Center - threats to aquatic biota and habitat and aesthetics due to sediment, petroleum products, increased runoff and temperatures due to parking lots and other development adjacent to brook and loss of riparian vegetation . c(1100,1400,1600,1900) s(4000,7600)

COMMENTS

The West Branch of the Batten Kill along with the Batten Kill was designated an Outstanding Resource Water (ORW) by the Vermont Water Resources Board on June 12, 1991 due to its natural, recreational, cultural and scenic values. Macroinvertebrate sampling was done on the West Branch at rivermile 3.4 in October 1993 and the community assessment was "good".

Main Stem Tribs - Batten Kill **VT01-05**

The macroinvertebrate community was sampled on Lye Brook at three locations in the 1990s. At milepoint 1.8, the macroinvertebrate community health and integrity was found to be excellent in 1993, 1994 and 1995. At milepoint 3.4, the community was found to be fair in 1993 and poor in 1994 and 1995. At milepoint 7.0 in 1995, the community was also in poor condition. Bourn Brook was sampled in 1995 and the macroinvertebrate community was found to be in excellent condition at rivermile 1.6 in Manchester and rivermile 4.1 in Winhall.

Field observations were made on the Green River in October 1999. The water clarity was excellent, no algae observed, the streambanks were stable at the points observed. Buffers were present although often narrow - about 10 feet to 20 feet from top of bank to horse pasture, corn field or yard although there were stretches with larger buffers as well. There was a proposal seeking an ACOE permit to restore natural channel form and stability to 800 feet of the Green River and restore 1500 feet of streambank vegetation in September 2002. This is in a location where the channel become unstable and its adjustment process and a possible headcut migration could result in sedimentation, loss of habitat, loss of property. The project, however, is now on hold.

GMNF fisheries staff did redd counts on 4 tributaries of the Batten Kill in fall 2001. Significant spawning in the lower 2 miles of the Green River was documented during that count with 69 redds in that reach of river. The Green River is thought to be a key spawning tributary of the Batten Kill. The GMNF has stream habitat and fish population data on several smaller headwater tributaries including the Mad Tom and little Mad Tom Brooks and the roaring Branch. Overall characterization is good habitat and fish populations but there are likely some factors limiting the stream potential capabilities including low percentage and distribution of pool habitat for summer and winter refugia and limited instream cover in the form of woody debris and water depth. Most other factors are in pretty good shape.

INFORMATION SOURCES

Steve Roy, GMNF fishery biologist - information from fishery and fish habitat studies on tributaries to the Batten Kill (2002)

Vermont DEC Water Quality Division Biomonitoring and Aquatic Studies Section - data and evaluation of macroinvertebrate samples from Lye Brook and Bourn Brook sites.

Vermont DEC River Management Section - information on Green River project

Use No.	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	50.4	0.6	0.0	4.5	0.0
20	Aquatic biota/habitat	49.5	1.5	0.0	4.5	0.0
21	Fish consumption	0.0	55.5	0.0	0.0	0.0
42	Contact recreation	55.5	0.0	0.0	0.0	0.0
44	Noncontact recreation	49.3	6.2	0.0	0.0	0.0
50	Drinking water supply	0.0	0.0	0.0	0.0	55.5
62	Aesthetics	54.0	1.5	0.0	0.0	0.0
72	Agriculture water supply	0.0	0.0	0.0	0.0	55.5

Impairment Cause	Magnitude	Size (mi.)
pH	H	4.50
Siltation	M	0.30
Siltation	T	1.50
Turbidity	S	0.30
Other habitat alterations	T	0.60

Impairment Source	Magnitude	Size (mi.)
Atmospheric deposition	H	4.50
Removal of riparian vegetation	T	1.50
Urban/developed land runoff	T	1.50

Main Stem Tribs - Batten Kill **VT01-05**

Permit No.	Point or Nonpoint Source Description	Receiving Water
3-0407	Mack Molding - cooling water	Dry Brook
9-0001	Village at Eagle Rise - indirect	Trib Batten Kill
9-0088	Pinnacle Sun & Ski - indirect	Trib Bromley Brook
9-0249	Riley Rink at Hunter Park - indirect	West Branch Batten Kill
1-0547	Manchester Real Estate Dev - SW (3)	Trib Batten Kill
1-0550	MJD Corp - SW (3)	Bromley Brook
1-0573	Town of Manchester - SW (2)	West Branch Batten Kill
1-0580	Keeland Company - SW (3)	Dry Brook
1-0584	Anthony Perry - SW (2)	West Branch Batten Kill
1-0635	Richard Bruggeman - SW (3)	Trib Munson Brook
1-0804	Chris Swezey III - SW (3)	Bromley Brook & Trib
1-0807	John Rusin Subdivision - SW (2)	Trib West Branch Batten Kill
1-0838	Mary Jane Swanson - Sw (3)	Trib Munson Brook
1-0921	Southview Homeowners Assoc - SW (1)	Trib Batten Kill
1-1101	Oak Knoll Corp - SW (1)	Bromley Brook
1-1175	A Safe Place Ktd - SW (1)	Little Mad Tom Brook
1-1166	Mack Molding Co Inc - SW (1)	Dry Brook
1-1273	Orvis Company Inc - SW (3)	Munson Brook
1-0692	Riverbend Partners LLC - SW	Batten Kill
1-1511	Hand Motors	West Branch Batten Kill
1-1540	Bourn Brook Properties LLC	Bourn Brook

Roaring Branch

Assessment Report

Waterbody No: VT01-06 **Assessment Year:** 2002

River Length (mi.): 29.5 **Date Last Updated:** 5/29/2002

Description: Mouth to headwaters and tributaries including Warm, Fayville, Branch Pond, Beaver and North Alder Brooks

Location Identifiers

ANR Enforcement District: 8 **NRCS District:** 1

Fish and Wildlife District: 1 **Regional Planning Commission:** BEN

Assessment Information

Monitored (mi.): 2.0 **Assessment Types**

Evaluated (mi.): 27.5 RBP III or equivalent benthos surveys

Water Quality Limited? N

On 303(d) List? Y

Monitored for Toxics? N

Aquatic Contamination **Toxics Testing**

Waste Management Zone - Miles: **Description:**

Assessment Comments

PARTIAL SUPPORT MILES

Branch Pond Brook: 2.0 - partial support of aquatic biota/habitat due to low pH from atmospheric depostion c(1000), s(8100)

COMMENTS

The Vermont Department of Fish & Wildlife has no indications of a fishery decline in Roaring Branch or the tributaries to it such as Warm Brook and Fayville Brook.

Vermont DEC Water Quality Division sampled macroinvertebrates on Branch Pond Brook at milepoint 0.1 in 1994, 1995 and 1996 and the community health was assessed as fair, good, fair respectively. EPT is low in the samples. Warm Brook was sampled in 1992 at rivermile 1.4 and the macroinvertebrate community assessment was "good". Fayville Branch was sample at rivermile 3.7 in 1992 and the community assessment was "good."

The Batten Kill Monitoring Program has monitored 3 sites, 1 each on the Roaring Branch, Warm Brook and Fayville Brook for 5 years. Their judgements of results from taxa richness, EPT richness and biotic index calculations range from fair to excellent. Their general conclusion for the Battenkill and tributaries was that "in the five years of the study, the benthic invertebrate populations indicate no areas of grave concern."

INFORMATION SOURCES

Roaring Branch **VT01-06**

Steve Fiske, Vermont DEC Water Quality Division - data and information on Branch Pond Brook (2001) Battenkill Monitoring Program reports 1990- 1995, Arlington Memorial High School Advanced Biology Class.

Use No.	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	27.5	0.0	2.0	0.0	0.0
20	Aquatic biota/habitat	27.5	0.0	2.0	0.0	0.0
21	Fish consumption	0.0	29.5	0.0	0.0	0.0
42	Contact recreation	29.5	0.0	0.0	0.0	0.0
44	Noncontact recreation	29.5	0.0	0.0	0.0	0.0
50	Drinking water supply	0.0	0.0	0.0	0.0	29.5
62	Aesthetics	29.5	0.0	0.0	0.0	0.0
72	Agriculture water supply	0.0	0.0	0.0	0.0	29.5

Impairment Cause	Magnitude	Size (mi.)
pH	M	2.00

Impairment Source	Magnitude	Size (mi.)
Atmospheric deposition	M	2.00

Permit No.	Point or Nonpoint Source Description	Receiving Water
3-1372	Arlington school - WW outfall	Warm Brook
3-1405	H & H Properties - WW outfall	Warm Brook
1-1316	Orvis Company - SW (3)	Fayville Branch
1-0739	Vermont Agency of Transportation - SW(1)	Trib Roaring Branch

Minor Tribs - Direct to N.Y.

Assessment Report

Waterbody No: VT01-07 **Assessment Year:** 2002

River Length (mi.): 23 **Date Last Updated:** 7/23/2002

Description: Minor Tributaries flowing directly into N.Y. State including Little White Creek

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Location Identifiers

ANR Enforcement District: 8 **NRCS District:** 1

Fish and Wildlife District: 2 **Regional Planning Commission:** BEN

Assessment Information

Monitored (mi.): 1.0

Evaluated (mi.): 22.0

Water Quality Limited?

On 303(d) List? N

Monitored for Toxics? Y

Aquatic Contamination

Assessment Types

Non-fixed station chemical/physical monitoring-conventional and tox

RBP III or equivalent benthos surveys

Monitoring data collected by other agencies or organizations

Toxics Testing

Waste Management Zone - Miles: **Description:**

Assessment Comments

THREATENED MILES

Little White Creek: 1.0 - from NY/VT border upstream to Route 153 - threats to aquatic biota/habitat, aesthetics, and secondary and contact recreation due to nutrient enrichment and sedimentation from agricultural activities (barnyard runoff, unfenced pastures, eroding banks from cow access..) . c(900,1100), s(1000)

Mill Brook: 3.2 - threats to aquatic biota/habitat, aesthetics, and contact recreation from sediment, turbidity, and nutrient runoff due to agricultural operations. c(900,1100) s(1000)

COMMENTS

The Tansitor Electronics site has been used since the 1950's as a manufacturing facility for electronic capacitors. The site was put on the Superfund list but in 1999 was delisted. There is long-term monitoring of groundwater at the site on a regular basis to evaluate changes in conditions over time and there is an environmental easement in place to prevent use of contaminated groundwater. No surface water impacts now at all found by DEC Wastewater Division monitoring. (2001) The former waterbody information was: trib to Browns Brook: 0.1 - aquatic biota, ag & drinking water supply, contact & noncontact recreation threatened due to waste from Tansitor Electronics dumped onto the ground adjacent to a stream draining into Browns Brook. Surface water samples found organics (TCEs, Perc) that exceeded "Water & Fish Ingestion" and "Fish Consumption Only" levels. Sampling near Tansitor site in 2/88 - 1/90 period found

Minor Tribs - Direct to N.Y. **VT01-07**

increased Cu in surface water and increased Cu, Ld and organics in groundwater.

White Creek was sampled in Rupert at rivermile 9.4 (50 m above Rte 153 bridge) in 1998 and the macroinvertebrate community was found to be in "excellent" condition. Earlier macroinvertebrate sampling found "a high number of chironomids and oligocheats in the samples." Also heavy growth of filamentous algae was noted. High nutrient inputs the probable cause.

Trout sampling was done at three locations on Little White Creek in August 1998. At the uppermost site, station elevation 1040, there were four class sizes of brown trout found (classes 1,2,4,5 represented) and three size classes of brook trout (size class 1,2, and 3). The population density was 209 trout/mile >= 6 inches. At station elevation 975, there were all five size classes of brown trout found and three size classes of brook trout. The population density was 321 trout/mile >= 6 inches. At station elevation 905, two size classes of brown trout were found (class 2 and 3) and two size classes of brook trout were represented. The population density was 124 trout/mile >= 6 inches.

INFORMATION SOURCES

Steve Fiske, Vermont DEC Water Quality Division - data from macroinvertebrate sampling (1988 and 1998)

Chet MacKenzie, Vermont Dept of Fish & Wildlife - data from fish population sampling on Little White Creek (Shaftsbury Hollow Brook) (2002)

U.S. EPA letter date August 23, 1999 announcing delisting of Tansitor Electronics from the National Priorities List (of Superfund Sites).

New York State Water Quality 1998 (New York 305(b) Report) - has a 7 mile segment of White Creek listed as threats to fish propagation due to silt and sediment from agricultural activities.

Vt. DEC Hazardous Materials files

Jennifer Kimberly, SCS - noted agricultural activities adjacent to streams (1988)

Use No.	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	18.8	4.2	0.0	0.0	0.0
20	Aquatic biota/habitat	18.8	4.2	0.0	0.0	0.0
21	Fish consumption	0.0	23.0	0.0	0.0	0.0
42	Contact recreation	18.8	4.2	0.0	0.0	0.0
44	Noncontact recreation	18.8	4.2	0.0	0.0	0.0
50	Drinking water supply	0.0	0.0	0.0	0.0	23.0
62	Aesthetics	18.8	4.2	0.0	0.0	0.0
72	Agriculture water supply	0.0	0.0	0.0	0.0	23.0

Impairment Cause	Magnitude	Size (mi.)
Priority organics	T	0.10
Metals	T	0.10
Nutrients	T	4.20
Siltation	T	4.20

Impairment Source	Magnitude	Size (mi.)
Agriculture	T	4.20
In-place contaminants	T	0.10